ts—p. 79
ability—p. 84
ng Jet Engine Parts—p. 90
Bath Troubles—p. 98
c Furnace Conference—p. 105
lants with Mills Do Well—p. 133
etal Makers Raise Sights—p. 137
of Conversion Deals—p. 140

Illinois U Library

The IRON AGE

DECEMBER 11, 1947

LAVINO
FERRO
MANGANESE
OGLEBAY
NORTON

LEBAY NORTON AND COMPANY
NA BUILDING • CLEVELAND 15, OHIO
SALES AGENT
Chicago 4, Illinois Office: 208 S. LaSalle Street
Detroit 26, Michigan Office: 2632 Buhl Building
Otsego, West Virginia • Montreal, Wisconsin

E. J. LAVINO AND COMPANY
528 WALNUT STREET • PHILADELPHIA 2, PA.
Pittsburgh 22, Pa. Office: 1819 Oliver Building

LAKE SUPERIOR IRON ORES
FERRO MANGANESE
DOCKS
HOT TOPS
COAL
FLUORSPAR
SPIEGELEISEN
PHOSPHATE ROCK
LAKE TRANSPORTATION

Take full advantage of Hoskins

HEAT-TREAT CASTING DESIGN SERVICE

Having trouble with heat-treat castings? Then take advantage . . . *full* advantage of Hoskins casting design service. It's a complete service . . . available at no extra cost . . . and it's backed by more than 20 years' experience in the casting business. Today, with ready reference to over 4000 tried and proven specialized designs, Hoskins engineers are well equipped to offer many practical suggestions for solving your particular casting problems.

Take a look at the castings shown, for example. They're made of our durable Alloy 502 . . . simply designed . . . strong . . . with as few welds as possible and with maximum flexibility in serving particular applications. Ample provisions are made for expansion and contraction encountered in use and, wherever practical, design and construction permit quick, easy, inexpensive replacement of parts.

Next time you're up against a tough casting problem, send it to Hoskins. We believe you'll like our design ideas as well as our durable Alloys. Both stand up under extremely hard service.

HOSKINS
ALLOY
for
HEAT-TREAT
OPERATIONS

Here's a helpful "Idea Book" for the man in your plant responsible for heat-treat castings —want a copy?

HEATING ELEMENT WIRE
Chromel*
NICKEL CHROMIUM

HOSKINS MANUFACTURING CO.

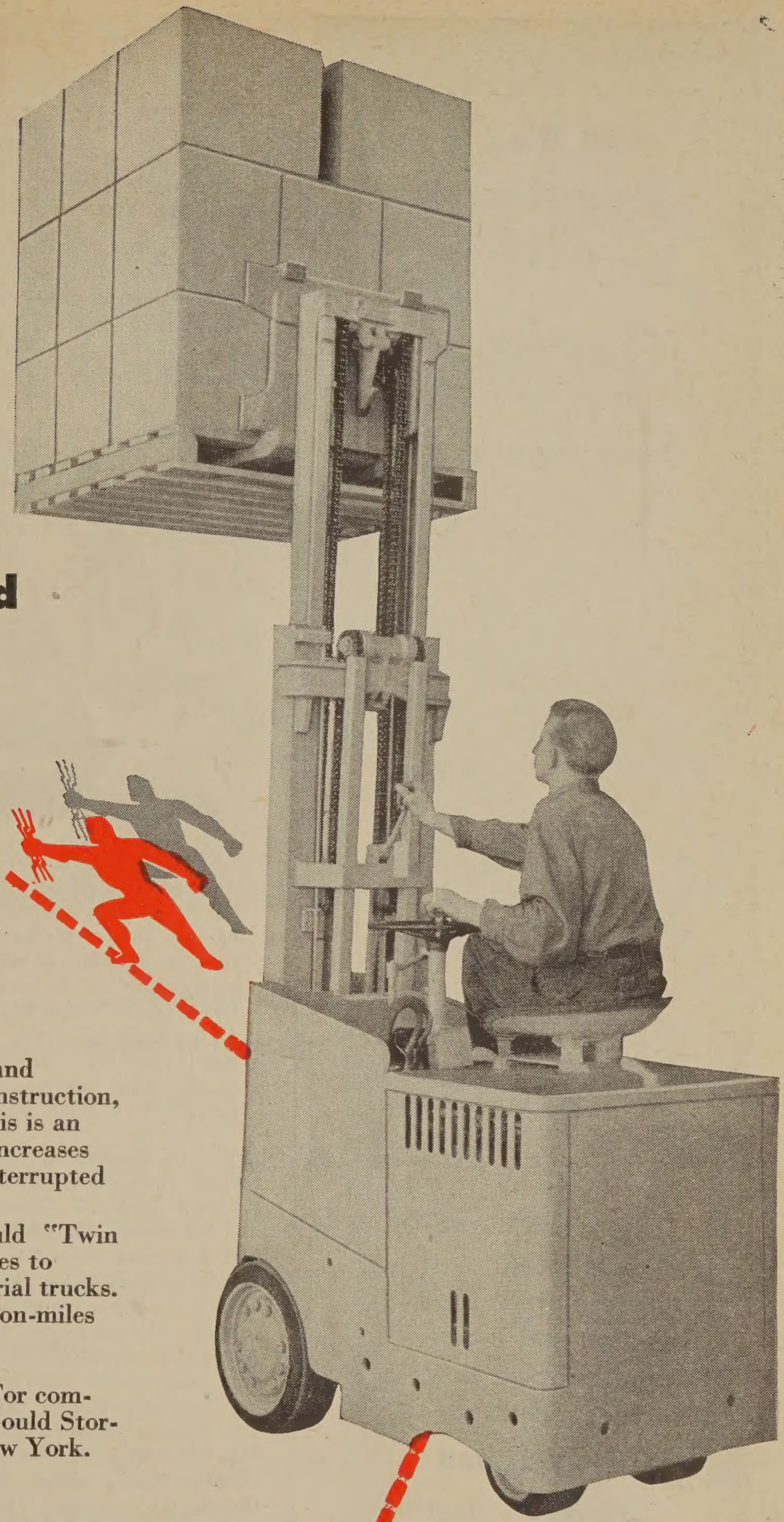
4445 LAWTON, DETROIT 8, MICHIGAN

ELECTRIC HEAT-TREATING FURNACES • HEATING ELEMENT ALLOYS • THERMOCOUPLE AND LEAD WIRE • PYROMETERS • WELDING WIRE • HEAT-RESISTANT CASTINGS • ENAMELING FIXTURES • SPARK PLUG ELECTRODE WIRE • SPECIAL ALLOYS OF NICKEL • PROTECTION TUBES

*TRADE MARK REG. U. S. PAT. OFF.

THE IRON AGE, published every Thursday by the *CHILTON CO. (INC.)*, Chestnut and 56th Sts., Philadelphia 39, Pa. Entered as second class matter Nov. 8, 1932, at the Post Office at Philadelphia under the act of March 3, 1879. $8 yearly in United States, its territories and Canada; other Western Hemisphere Countries $15; other Foreign Countries $20 per year. Single Copies 35¢. Annual Review Number, $2.00. Vol. 160, No. 24.

Your electric industrial trucks will do more work when powered by the new "TWIN POWER" GOULD BATTERY



Gould research, which introduced and perfected the famous Kathanode construction, has now created "Twin Power". This is an improvement in plate balance that increases power output and insures long, uninterrupted service.

In modern material handling Gould "Twin Power" Batteries add new advantages to the many inherent in electric industrial trucks. Their sustained power means more ton-miles each shift. Thoroughly protected, they are unusually free from service breakdowns: they stay on the job. For complete information get Catalog 100, Gould Storage Battery Corporation, Depew, New York.

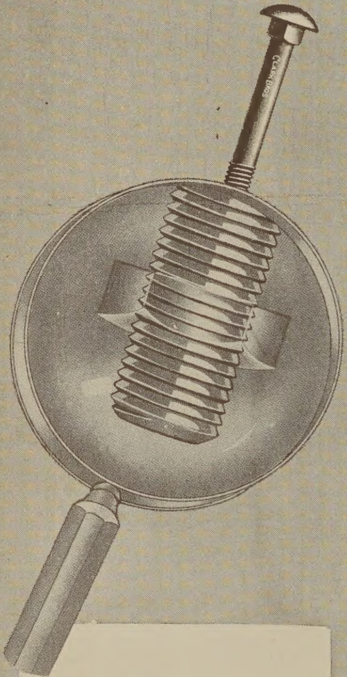
GOULD STORAGE BATTERY CORPORATION
Including the
Philco Corporation,
Storage Battery Division

FOR GOULD SERVICE
CALL GOULD IN THE FOLLOWING CITIES:

Boston, Mass. • Cincinnati, Ohio • Cleveland, Ohio Chicago, Ill. • Denver, Colo. • Depew, N.Y. • Detroit, Mich. • East Point, Ga. • Kansas City, Mo. • Los Angeles, Cal. • New York, N.Y. • Philadelphia, Pa. • Pittsburgh, Pa. • St. Louis, Mo. • St. Paul, Minn. • San Francisco, Cal. • Trenton, N. J. • Washington, D. C. • West Salem, Ore. • Kingston, Ont., Canada. NOTE: Electric hand truck batteries are stocked at many of these cities.

GOULD *"Thirty" and* KATHANODE BATTERIES

The Threads
of the BOLT
and the Threads
of the NUT
of
CLARK BROS
PRODUCTS
Synchronize



Such scientific production results in uninterrupted production and a constant uniform flow in your plant.

Ask — Demand the
**Nuts
Bolts and
Screws**
made by

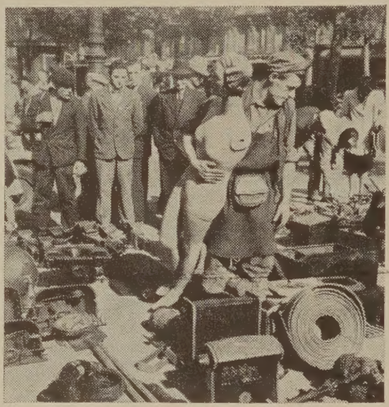
CLARK BROS BOLT Co.
MILLDALE CONN.

Fatigue Cracks

BY C. T. POST

Junkyard Venus

• • E. Spire, research laboratory, L'Air Liquide, Montreal, objects to the following caption used with this picture which appeared on page 105 of the Oct. 30, 1947, issue:



"JUNKYARD VENUS: Richard Lenoir, carrying one of his purchases, looks over some of the other pieces collected for the opening of the annual scrap fair on a boulevard in Paris. Once confined to old objects made of iron, the fair now includes all kinds of goods, from gas masks to statues."

Writes Reader Spire: "Are you certain that the picture represents Richard Lenoir? The poor man has been dead for quite some time and does not care for Venus. He was the founder of the cotton industry in France during the 19th century and gave his name to the Boulevard on which the scrap iron fair takes place each year."

First impulse of the editorial department when confronted with this challenge was to cable Pierre Benoit, Paris editor, to hunt up the Richard Lenoir shown in the picture and get hold of a lock of his hair or some other proof that he is alive and kicking.

On second thought, the editors decided they might have a better chance to get out of the hole by accepting Lenoir's demise and challenging the assertion that he "does not care for Venus." After all, they argued, Venus isn't alive either, and a gal like that might well be twisting a wealthy cotton manufacturer around her little finger in the great beyond.

All we want to ask the editors is, "What little finger?"

Bamboo Steel

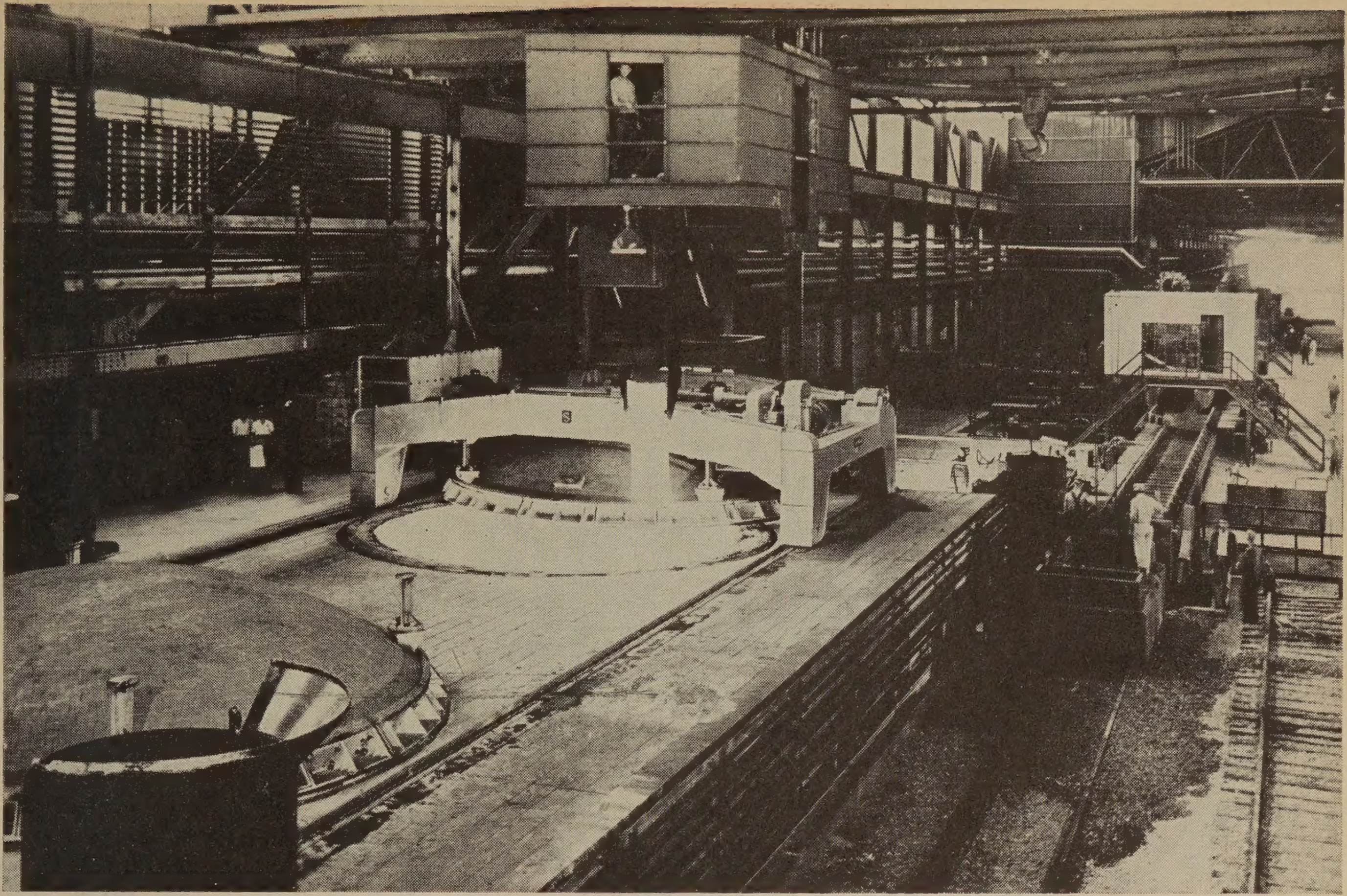
• • Among the tariff concessions obtained from foreign countries as a result of recent negotiations, we note that the State Department proudly states that China will retain its present relatively low duties on bamboo steel. With all the special bond reinforcing bar designs now on the market, we wonder if there are any American mills left still rolling the old bamboo design.

Nittany Lions

• • Now that Penn State's football team has roared through the season undefeated to win an invitation to the Cotton Bowl on New Year's Day, we feel it's appropriate to write our little expose on the Nittany Lions.

The football fan is accustomed to the appropriate use of the lion, king of the jungle, as the chosen nickname of various athletic teams from coast to coast, and from grammar school to college. But Penn State's Nittany Lion is something extra special thanks to R. M. Gibbs, business manager of your favorite family journal and loyal Penn State alumnus.

The Penn State campus is located at the foot of a mountain spur in central Pennsylvania known as the Nittany Mountains; hence, the school's teams became known as the Nittany Lions early in their history. But, until Gibbs came along, about a quarter-century ago, the Nittany lion was pictured as the common garden variety African lion, no different from the Columbia or M-G-M breed. At the time, young Gibbs, editor of the campus humor magazine, discovered that a breed of mountain lion, native to the nearby range, was a particularly ferocious character. Without consulting the dean, or even the campus cheer leader, he sent the African lion trotting, and depicted the native lion as symbol of the college. The howl from tradition-imbued alumni was terrific, and they descended on the campus as an ugly mob just before the big game. With the heat on, Editor Gibbs, doubling as the team's star tackle, pulled the game out of the fire. The Nittany Lion, king of the central Pennsylvania mountains, has reigned supreme ever since.



THE SALEM CIRCULAR SOAKING PIT

. . . is highly adaptable to various layouts, regardless of contour of the area available for heating ingots, incidental to blooming or slabbing mill operations.

It has been established that the circular pit is able to produce more tons per square foot of floor space occupied than other types of heating equipment. This is understandable, because the circular pit offers *high rates of effective B. t. u. release,* resulting in more rapid heating.

Illustrated is a typical circular pit installation where operating records prove that tonnages produced per unit of area exceed those of other types of heating equipment under comparable conditions.

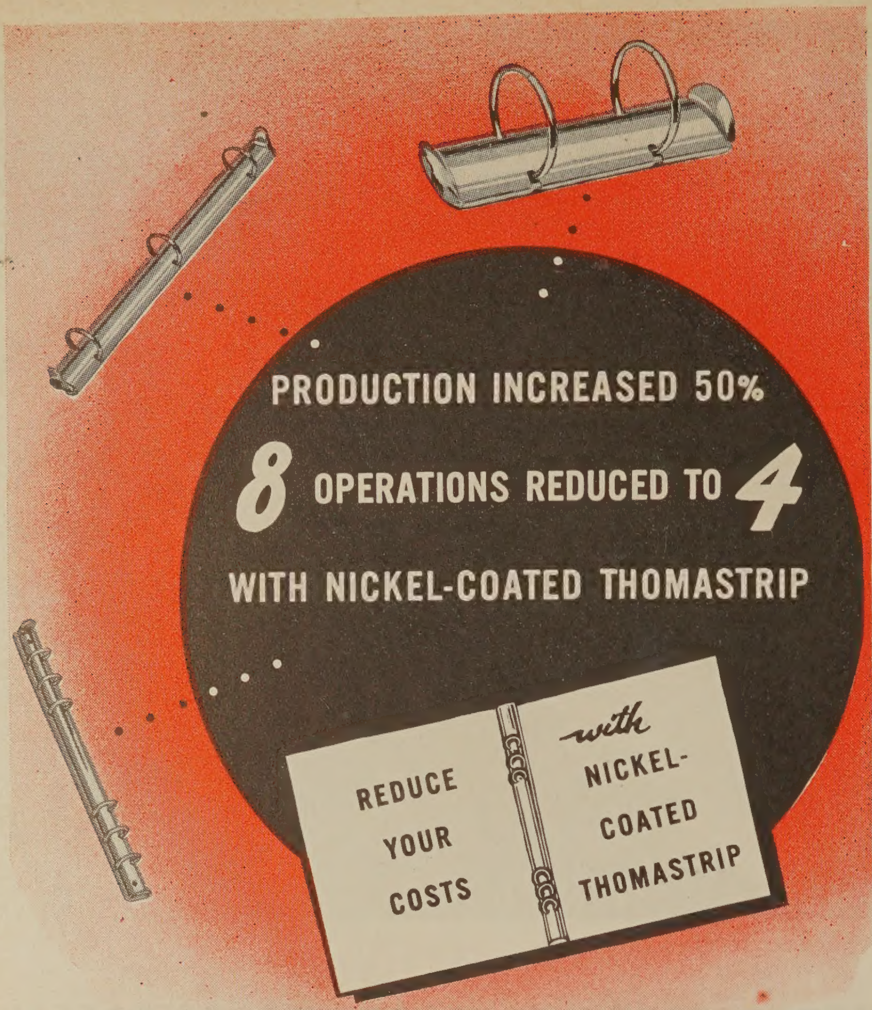
SALEM ENGINEERING CO. · SALEM, OHIO
SOUTHWEST OFFICE · FORT WORTH, TEXAS
SALEM ENGINEERING CO. (Canada) Ltd., TORONTO
SALEM ENGINEERING CO. · SHEFFIELD, ENGLAND

SALEM

ALL OFFICES STAFFED FOR . . ENGINEERING, CONSTRUCTION and OPERATION

Salem Builds

CIRCULAR SOAKING PITS
ROTARY HEARTH FURNACES
CONTINUOUS BUTT-WELD FURNACES
CAR BOTTOM FURNACES
FORGE FURNACES
HEAT TREATING FURNACES
NEEDLE METALLIC RECUPERATORS
AIR RECIRCULATING FURNACES
GAS ATMOSPHERE FURNACES
MECHANICAL EQUIPMENT FOR CHARGING AND DISCHARGING MATERIAL FROM FURNACES


PRODUCTION INCREASED 50%
8 OPERATIONS REDUCED TO 4
WITH NICKEL-COATED THOMASTRIP
REDUCE YOUR COSTS
with NICKEL-COATED THOMASTRIP

A manufacturer of loose leaf metal parts switched to pre-coated nickel THOMASTRIP for his stampings. Jot down the results in your loose leaf notebook:

1. Eight costly operations starting with uncoated steel (cleaning, plating, buffing, slitting, forming, assembling, degreasing, and packing) were reduced to 4 (forming, assembling, degreasing, and packing).
2. Rejects, due to flaking of the nickel plating, were eliminated, cutting costs over 10%.
3. Production was stepped up 50%.
4. Storage space is being saved, and handling costs were reduced.
5. The finished products are more satisfactory due to gauge accuracy and uniformity in temper and plating.
6. Finished products are far superior than before—more durable . . . better-looking . . . have more sales appeal.

ThomaStrip is available in a wide range of finishes, coatings, special tempers, and analyses. It has saved time and money for many manufacturers, and may develop production short-cuts for you, too. Why not check into it today?

THE THOMAS STEEL CO. · WARREN, OHIO

COLD ROLLED STRIP STEEL SPECIALISTS

ThomaStrip
COLD ROLLED STRIP STEEL
REG. U. S. PAT. OFF.
Electro-coated Zinc, Copper, Nickel and Brass . . . Hot Dipped Tin and Solder
Lacquer Coated in Colors . . . Uncoated Precision Strip . . . Carbon and Alloy Specialties

Dear Editor:

NONMETALLIC POWDER

Sir:

In the Sept. 4 issue, p. 59, a Newsfront item states, "Newly developed nonmetallic powder can be compacted and magnetized to have a coercive force equivalent to that of Alnico II of the same weight. These magnets are said to weigh only a third as much as Alnico and their cost is much lower." Would you give us some more information on this development, or direct us to the company or laboratory carrying on this work, so that we may obtain more information?

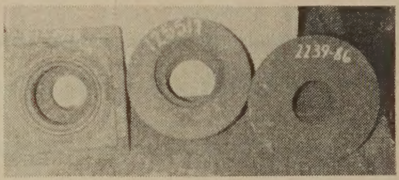
A. N. CURTISS
Manager, Engr. Products Dept.
Radio Corp. of America
Camden, N. J.

● Write to Mr. Harold Miller, Vice President of Engineering, Charles Hardy Inc., 420 Lexington Ave., New York 17.—Ed.

IDENTIFICATION?

Sir:

We are wondering if you might be able to furnish the names of either the manufacturers or shippers of the three different castings illustrated in the snapshot. Part 2239-86 weighs 136 lb, has an ID of 5 in. and OD of 17 in.; part 125517 weighs 194 lb, has a large ID of 9¼ in. and a large OD of 16 in.; part 41-1716 weighs 131 lb, is 19 x 18 in. sq and has an ID of 5 in. These numbers are manufacturers' serial number or part number. Thank you for any information you might be able to supply.



M. B. HOFMANN
Personnel Director
Liberty Trucking Co.
Chicago

● Can any reader identify the castings? —Ed.

BASING POINT SYSTEM

Sir:

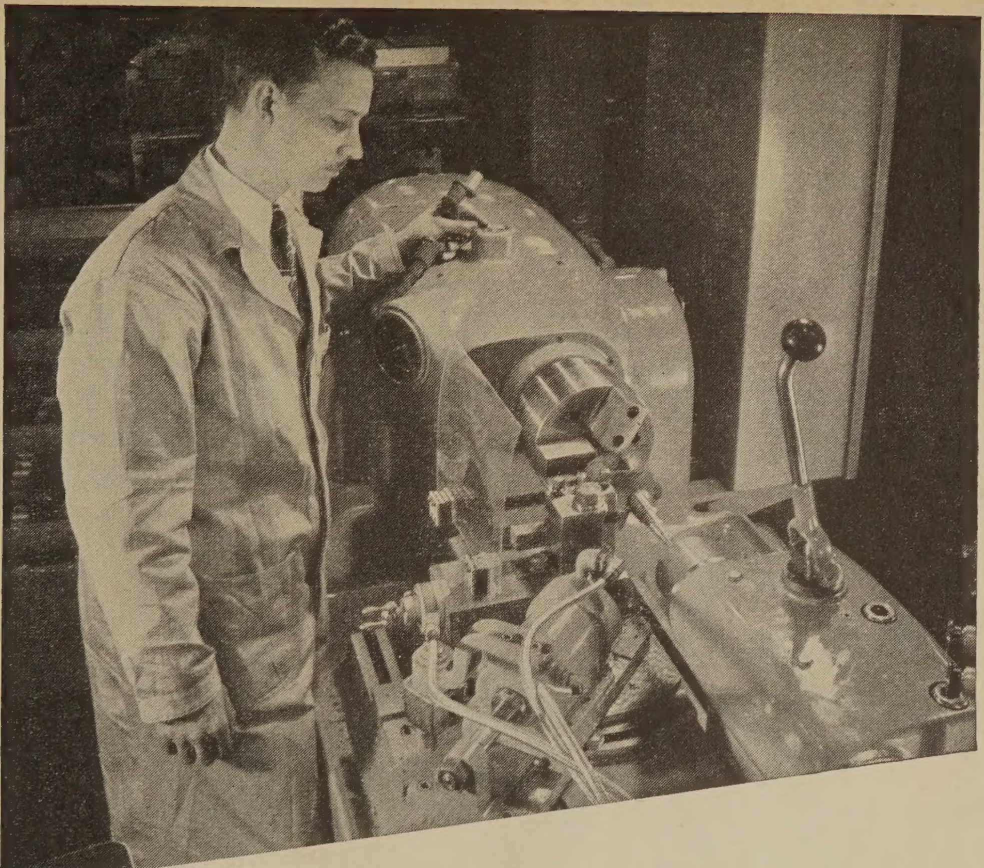
We would appreciate tear sheets or a photostatic copy of the article, "ABC of Basing Point System" by T. Campbell which appeared in the Oct. 4, 1945 issue, p. 120.

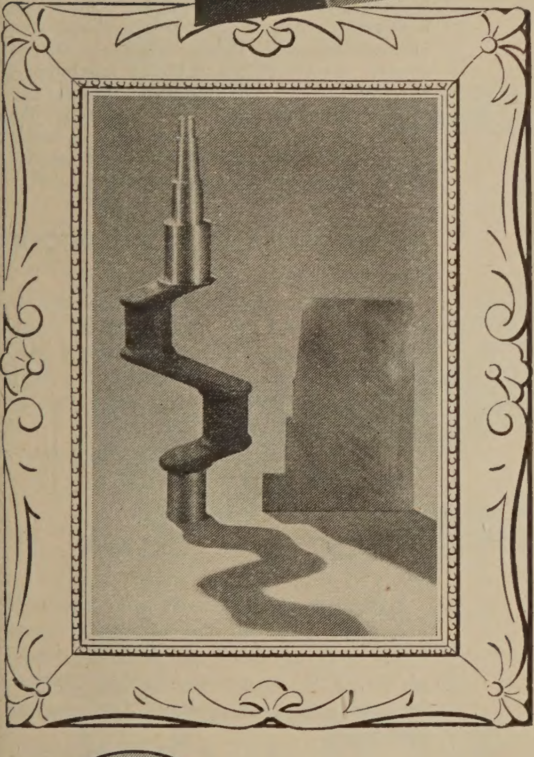
GODFREY L. CABOT, INC.
Boston

SLUSH CASTINGS

Sir:

We have been told your magazine carried an article concerning slush castings. However, we were not informed in what issue the article appeared. We wish to obtain two





PROFILE PORTRAIT OF PRODUCTION

Floor-to-Floor Time—24 Seconds!

(Former Machining Time, on Multiple Tool Automatic—40 Seconds)

Here's a 10¾″ compressor crankshaft machined within limits of .0005″ maximum error on all diameters—as proved on a 2,000 lot run.

That's the Monarch way to "*peak production at a profit*".

The machine that makes this outstanding record is a 2,000 rpm Monarch Uni-Matic, equipped with the new Air-Gage-Tracer Uni-Mat—just announced at the Machine Tool Show.

With this Uni-Matic you'll get not only greater accuracy and increased production—you'll get finished parts at a fraction of the former tool cost—and with substantially less down time.

On this job, tool change, necessary only after 350-400 pieces, requires less than one minute.

All surfaces of the crankshaft are machined by a continuous, single tool cut. A chamfer, multiple diameters, a taper, radii and shoulders—all are Air-Gage-Traced from the master template on a fully automatic machining cycle. The operator merely loads, presses the starter button, and unloads when the cycle is complete.

May we show you how the Monarch Turning Machines can cut costs in your shop?

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

FOR A GOOD TURN *FASTER* — TURN TO MONARCH

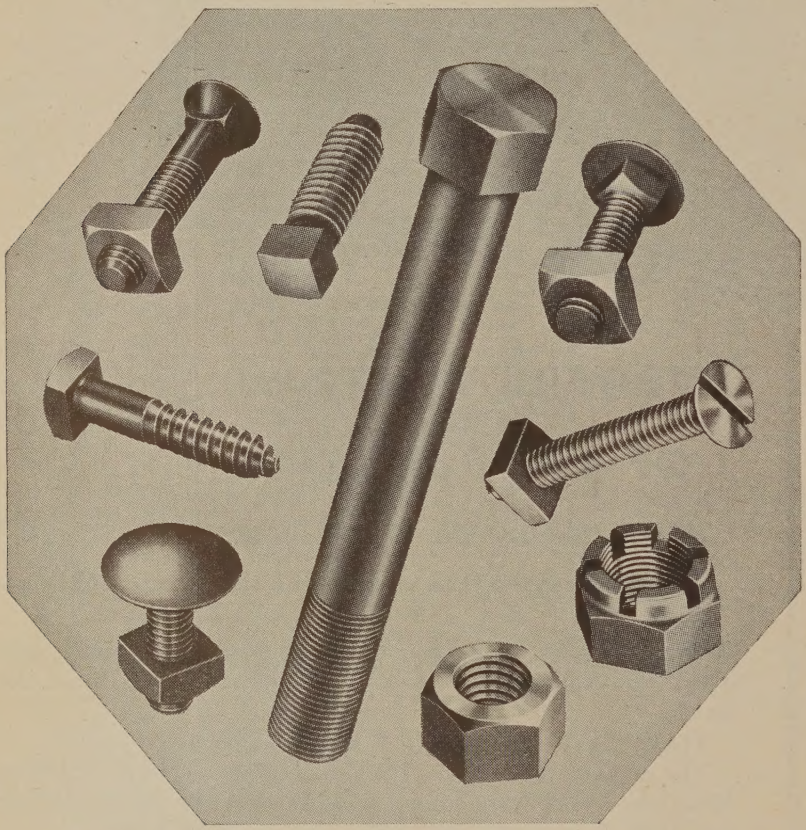
TRIPLEX

for

Toughness

IN THREADED FASTENERS

Not made in fancy finishes but made to stand the gaff



Threaded fasteners are made to hold parts together. And those fasteners that hold tighter, longer, generally have high tensile strength and toughness. That's the main thing that counts isn't it?

The tough TRIPLEX line is quite complete, including cap screws, set screws, machine bolts, carriage bolts, lag bolts, stove bolts, semi-finished nuts, castellated nuts, etc.

Write for copy of our new catalog.

THE TRIPLEX SCREW COMPANY

5309 GRANT AVENUE • CLEVELAND 5, OHIO

TRIPLEX THREADED FASTENERS

CAP AND SET SCREWS • BOLTS, NUTS AND RIVETS

copies and would appreciate your sending them to us.

H. HAMILTON
Purchasing Agent

Ray Products
Cincinnati

● "Solid and Slush Type Zinc Alloy Permanent Mold Castings" appeared in the May 29 issue. Tear sheets have been mailed. —Ed.

TABLE OF CONTENTS

Sir:

We would like to know why it is necessary for the table of contents in your magazine to be buried somewhere in the advertising of the magazine making it very difficult to locate at a moments notice. From our point of view it seems that it would be very worth while if this could be placed at the very beginning of the magazine.

PAUL G. HINRICHS
Controller

Midwest Mfg. Co.
Galesburg, Ill.

● The readers' point of view is readily understood. However, in the case of a weekly publication like THE IRON AGE in which the printing is on an extremely fast schedule, this is impossible. If the table of contents were printed as the first page in the magazine it would have to run on the printing presses with color advertising which would necessitate its going to press almost a week prior to the issue date. This would preclude getting in last minute changes or information on the contents page. Of necessity, therefore, the table of contents is run further back along with last minute editorial technical material. To help the reader there is on the front cover a table of contents with a list of important articles in the issue and the page numbers.—Ed.

PRECISION CASTING TECHNIQUE

Sir:

We have misplaced our Nov. 9, 1944 issue and are interested in reading the article, "Equipment and Material for Precision Casting." Will you please send us the magazine or tear sheets of the article.

F. W. ENZENBACHER

National Bronze Co.
Springfield, Mass.

REQUEST FROM HOLLAND

Sir:

I should appreciate it very much if you could give me the names of some firms making seam welders for strip up to 0.1 in. and firms selling copper, bronze and iron-powder for porous bearings.

H. V. ZUILEN
Metallurgical Engineer

Prins Mauritsweg 83
Aalst, Holland

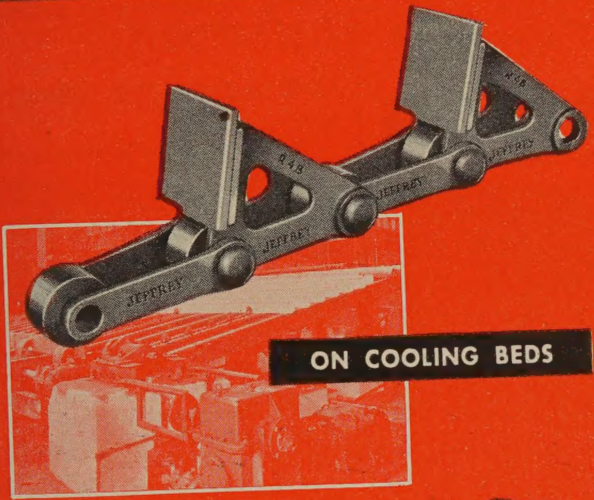
● Names of such firms are being sent.—Ed.

MICROHARDNESS TESTER

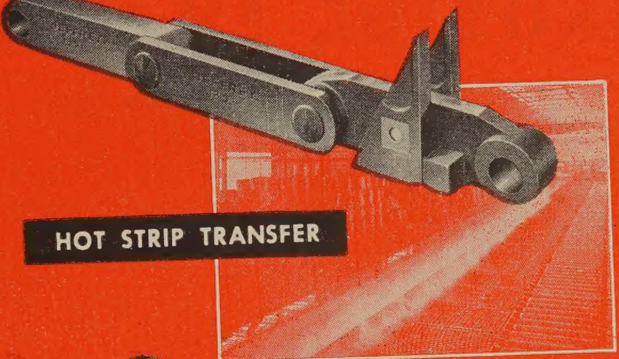
Sir:

In the Sept. 18 issue, p. 69, there is an article on a new microhardness tester, viz: "Microsclerometer L.C." We are interested in obtaining complete details on this tester and will

Complete line of
STEEL MILL CHAINS



ON COOLING BEDS



HOT STRIP TRANSFER

CROP CONVEYORS

DRAW BENCH CHAIN

HOT COIL CONVEYORS

SHEET COIL CONVEYORS

THE JEFFREY
MANUFACTURING COMPANY

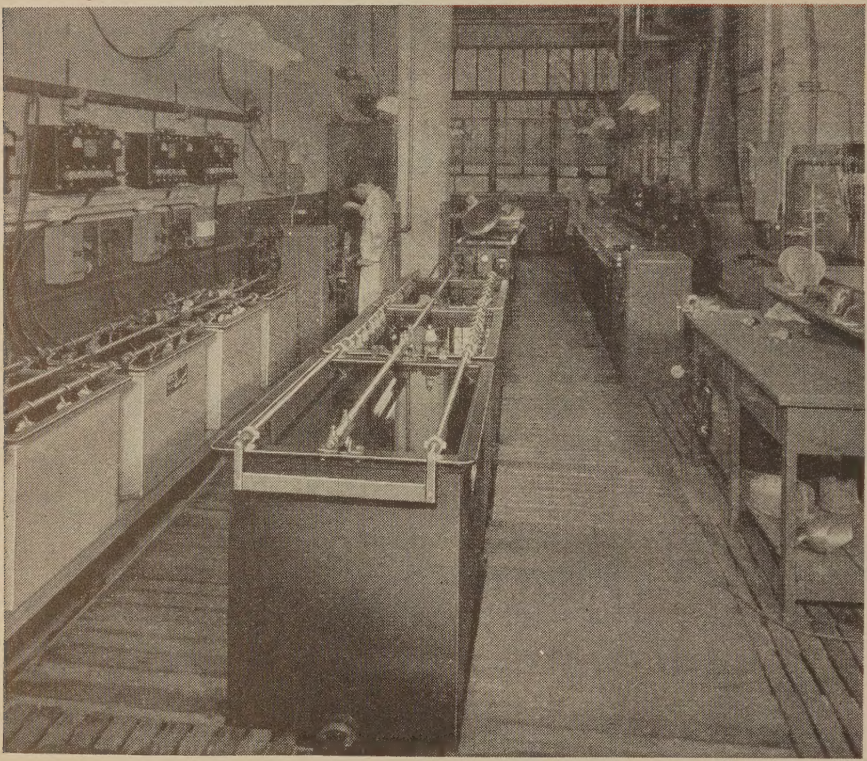
ESTABLISHED 1877

925-99 North Fourth St., Columbus 16, Ohio

Baltimore 1
Birmingham 3
Boston 16
Buffalo 2
Chicago 1
Cincinnati 2
Cleveland 13
Denver 2
Detroit 13
Harlan
Houston 5
Huntington 19
Jacksonville
Milwaukee 11
New York 7
Philadelphia 3
Pittsburgh 22
St. Louis 3
Salt Lake City 1
Scranton 3

Complete Line of Material Handling, Processing and Mining Equipment

A SPECIAL UDYLITE SERVICE To help you



THE UDYLITE PILOT PLANT

is the proving ground

∽ ∽ the link between the laboratory and the plating room. *Here your samples* are processed under actual plating room conditions. *Here your plating* problems are solved; new, more efficient cycles are worked out. *Here is determined* the practicability of the proposed equipment *before* the purchase—*before* the installation. *Here again Udylite* provides special service to every Udylite customer.

Udylite

THE UDYLITE CORPORATION

DETROIT 11, MICHIGAN

REPRESENTED IN PRINCIPAL CITIES

appreciate knowing the source from which we can receive this information.

L. E. BAUSER
Asst. Mechanical Supt.
Bulova Watch Co.
Woodside, N. Y.

● Further data can be had by writing to "Revue de Metallurgie," 5 Cite Pigalle, Paris 9ᵉ, France.—Ed.

CHROME PLATED TUBING

Sir:

Will appreciate it very much if you will give us a list of producers of chrome-plated steel tubing. We are especially interested in 4-in. tubing with 1/16-in. wall.

GEORGE BRENEMAN
Randolph Foundry & Machine Co.
Randolph, N. Y.

● Production of chrome plated steel tubing in a 4-in. size is a custom plating proposition we understand. However, we are sending names of companies who may be able to fill your needs.—Ed.

DIESEL ENGINEERING

Sir:

Could I trouble you to do me a favor by putting me in touch with some young American aged 27 to 32 years who would be willing to correspond with me and to exchange technical magazines, preferably on diesel engineering. I am 27 years of age, workshop and technical college trained, and at present employed on the design of diesel engines of from 400 to 3000 bhp.

J. GRUNDY
54 Rookery Lane
Lincoln, England

GRAPHICAL CORRELATION

I noticed in the Nov. 6 issue an article by Charles R. Taylor, "Graphical Correlation—Its Application to Steel Mill Problems." If possible I would like to obtain about ten reprints or tear sheets.

G. M. ENOS
Prof. of Metallurgical Engineering
Purdue University
Lafayette, Ind.

CARBIDE MILLING CUTTERS

Sir:

I would like to get a copy of the series of articles by Frommelt, "Carbide Cutters for Milling."

D. A. CARGILL
Project Engineer
Process Development Section
General Motors Corp.
Detroit

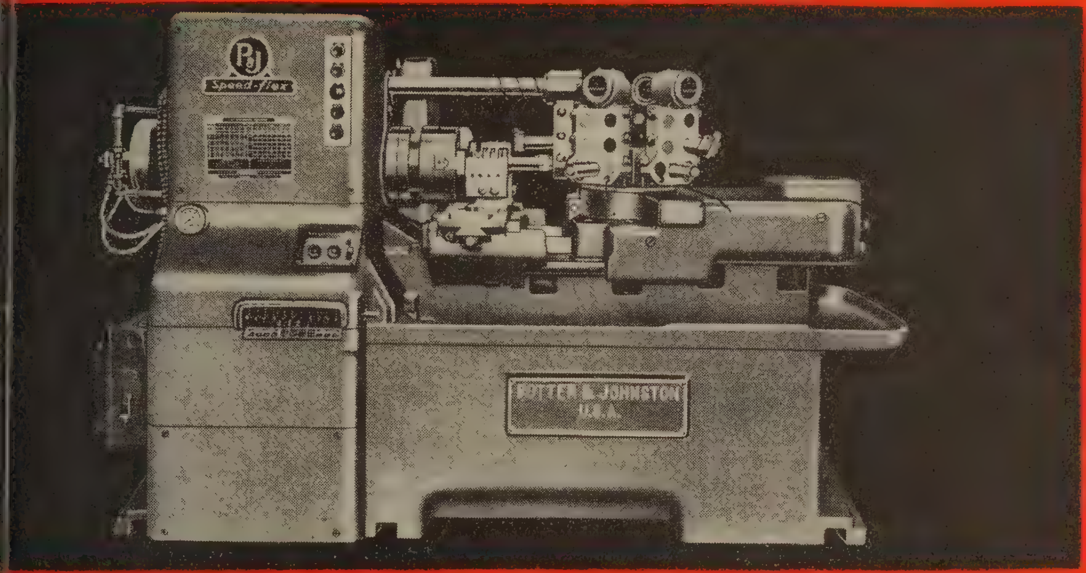
● The series in booklet form is available to subscribers at $1.00 per copy.—Ed.

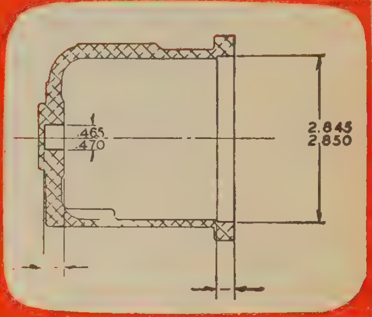
METAL POWDER MEETING

Sir:

We read in your journal on p. 60 of the May 22 issue, an article about the Third Annual Metal Powder Meeting. As we are interested in a report of all the lectures and the discussions held at the meeting but do not know the address of the Metal Powder Assn., we would appre-

Tooled for the job, this
P & J 3U SPEED-FLEX
machines a piece every 45 seconds





DETAILS OF JOB

Part: Governor Body

Material: Die Cast Aluminum

Method and Operation:
Presenting closed end to spindle, grip on body with two fixed jaws and one swivel jaw.

Machine as follows:

1st T.F.: Bore 2.845" dia.; rough and finish face end.

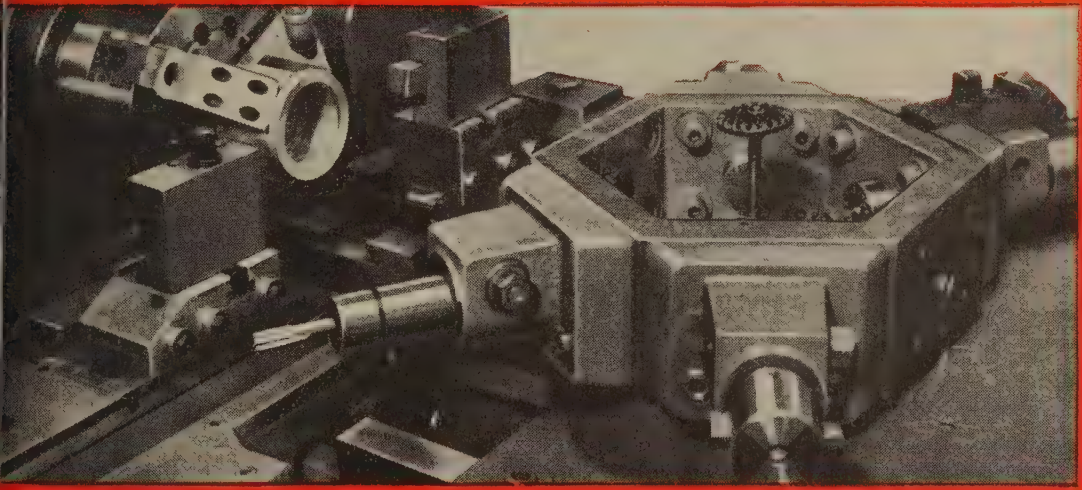
2nd T.F.: Machine .465 dia. to depth.

3rd T.F.: Ream 2.845" dia. x 3/16" deep.

4th T.F.: Ream .500" dia.

•

Average time per piece, floor-to-floor: .76 min.



Actual production time (floor-to-floor) on the governor body being machined here is .76 minutes, equivalent to approximately 80 per hour. Fast work such as this is by no means exceptional when handled on the P&J 3U Speed-Flex, a new Automatic Turret Lathe designed especially for the machining of small castings and forgings up to 6" diameter. Like all P&J machines, the 3U Speed-Flex provides for wide flexibility in tooling.

Standard spindle speed range is from 73 to 1445 rpm with optional dual speed ranges of 36 to 711 and 73 to 1445 rpm. Six faces on the turret simplify the mounting of tools. Split-second automatic changes in feeds and speeds under electro-pneumatic control, available with the machine under cutting load, reduce non-cutting time to a minimum.

Further details are available on request, as well as the cooperation of P&J engineers to help you simplify your problem of producing duplicate parts.

. . . POTTER & JOHNSTON MACHINE CO., PAWTUCKET, R. I.

Pioneer Manufacturer of Automatic Turret Lathes

18-8 STAINLESS...

Tried and True

TO anyone but a metallurgist, the nominal analysis of Circle Ⓛ 22XM (table at left) may not look much like an "18 and 8" alloy. And yet it is the legitimate offspring of this famous family of corrosion resistant alloys which have proved their worth in hard, practical service for a generation.

Improvements in analysis, in heat treating, and in modern foundry practice make it a practical material whenever corrosion cuts into operating profits or threatens product integrity.

Circle Ⓛ 22XM is one of several "18 and 8" Stainless Alloys which account for a high percentage of our electric induction furnace output. We will be glad to help select the right one for your purpose. Write for convenient reference chart.

LEBANON CIRCLE Ⓛ 22XM

NOMINAL ANALYSIS	
Carbon Max.	0.07
Silicon	1.25
Manganese	0.75
Chromium	19.50
Nickel	10.00
Molybdenum	2.25

NOMINAL PHYSICAL PROPERTIES	
Tensile Strength	82,000
Yield Point	42,000
Elongation in 2"—%	50
Brinell Hardness	160

LEBANON STEEL FOUNDRY • LEBANON, PA.
"In The Lebanon Valley"
ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

LEBANON
ALLOY AND STEEL
Castings
CIRCLE L

ciate it if you could procure us a copy of the report in question.

NOURY & VAN DER LANDE
AFDEELING II
Deventer, Holland

● A complete transcript of proceedings of the meeting is available from the Metal Powder Assn., 420 Lexington Ave., New York. The cost is $2.50. There is a similar report for the 1946 meeting and both reports may be purchased for $3.50.—Ed.

FOUNDRY IRON PRICES

Sir:

The City of Chicago has entered into a contract for cast iron water pipe and special water pipe castings, which contract contains an escalator clause under which the contract base price is to be increased (or decreased) in accordance with the "price of No. 2 foundry iron, f.o.b. Birmingham, as published in THE IRON AGE on the date of shipment." Reference to recent issues discloses a price of $33.38, and just below that price another of $36.38. Will you please tell us why the two prices, and which one is effective . . .

B. W. CULLEN
Supt., Water Pipe Extension
Dept. of Public Works
Chicago

● One of the three pig iron producers at Birmingham has announced a price $3 per ton above the others. Under these circumstances we show a price spread which is averaged on the Comparison of Price page. It would seem that your solution to the problem would be to use the average price quotation as basis for your contract.—Ed.

PROJECTION COMPARATOR

Sir:

We would appreciate your sending us the address of the manufacturer of the Pant-O-Jector described in the article, "Inspecting Turbosupercharger Blades by Optical Projection Comparator" which appeared in the Jan. 16 issue, p. 40.

R. FLEURY
Societe Nationale D'Etude et de Construction
de Moteurs d'Avions, Suresnes, France

● We have asked the Engineers Specialty Div., Universal Engraving & Color Plate Co., Inc., 588 Monroe St., Buffalo, to send you data on the Pant-O-Jector.—Ed.

BOXCAR SITUATION

Sir:

We are particularly interested in an article having to do with an analysis of the boxcar situation. We are informed that it was a very complete discussion, but we are unable to find out which issue it appeared in . . .

R. M. SLATER
Ash Grove Line & Portland Cement Co.
Kansas City

● Tear sheets of "More Fireworks Due in Collapse of Freight Car Building Program" which appeared in the Oct. 2 issue, p. 111, are being mailed to you.—Ed.

THOMAS L. KANE
Publisher

o o o

R. M. GIBBS
Business Manager

o o o

B. H. HAYES
Production Manager

C. E. ELLIS
Promotion Manager

O. L. JOHNSON
Manager Market Research

o o o

CHARLES T. POST
Manager Circulation and Reader Service

o o o

Executive Offices
Chestnut and 56th Sts.
Philadelphia 39, Pa., U.S.A.
Editorial and Advertising Offices
100 E. 42nd St., New York 17, N.Y., U.S.A.

o o o

Regional Business Managers

FRED BANNISTER
W. Hartford 7, Conn.
62 La Salle Road

ROBERT F. BLAIR
Cleveland 14
1016 Guardian Bldg.

C. H. OBER
H. E. LEONARD
New York 17
100 East 42nd St.

PEIRCE LEWIS
Detroit 2
103 Pallister Ave.

B. L. HERMAN
Philadelphia 39
Chilton Bldg.

STANLEY J. SMITH
Chicago 3
1134 Otis Bldg.

JOHN M. HUGGETT
Pittsburgh 22
814 Park Bldg.

R. RAYMOND KAY
Los Angeles 28
2420 Cheremoya Ave.

o o o

Owned and Published by
CHILTON COMPANY
(Incorporated)

OFFICERS AND DIRECTORS
JOS. S. HILDRETH, *President*
EVERIT B. TERHUNE Vice-President
P. M. FAHRENDORF Vice-President
JULIAN CHASE Vice-President
THOMAS L. KANE Vice-President
G. C. BUZBY Vice-President
CHARLES J. HEALE Vice-President
WILLIAM H. VALLAR, Treasurer
JOHN BLAIR MOFFETT, Secretary
HARRY V. DUFFY T. W. LIPPERT
FRED V. COLE

o o o

GEORGE MAISWINKLE, Asst. Treas.

o o o

Chilton Editorial Board
PAUL WOOTON
Washington Representative

o o o

Member, Audit Bureau of Circulation

Member, Associated Business Papers

o o o

Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price United States, its Territories and Canada $8; other Western Hemisphere Countries $15; Foreign Countries $20 per year. Single Copy, 35¢. Annual Review Number, $2.00.

o o o

Cable Address, "Ironage" N. Y.

o o o

Copyright, 1947, by Chilton Company (Inc.)

The
IRON AGE

Vol. 160, No. 24 December 11, 1947

Editorial

More Light On Aid 81

o o o

Technical Articles

Hardenability 84
X-Ray Inspection of Aluminum Jet Engine Castings 90
Radius-Truing Centerless Grinding Wheels 93
Microradiography 94
Oxygen Used in 726 O H Heats 97
Diecasting in Germany 97
Common Plating Bath Troubles 98
Stampings for Welded Fabrication 102
Electric Furnace Steel Conference 105
German Wartime Technical Developments 108
New Equipment 109

o o o

Features

Fatigue Cracks 68
Dear Editor 70
Newsfront 83
Assembly Line 112
Washington 116
West Coast 120
Personals and Obituaries 124
European Letter 128
Industrial News Summary 130
News of Industry 133
Gallup Polls 145

o o o

News and Markets

Auto Firms With Steel Mills Fare Better 133
Clad Metal Makers Raise Their Business Sights 137
A Steel Conversion Deal in the Making 140
50 Years Ago 143
Industrial Briefs 144
New Construction 146
Canadian Iron and Steel Production 147
More Canadian Copper for U. S. 151
Worker Welfare Placed Above Sales 152
Sweden Making More Heavy Rolled Products 156
British October Exports Near July Record 157
Pig Iron Essential in British Reconstruction 162
Mechanical Engineers Grant Awards 163
British Priorities Favor Export Items 166
Machine Tool Developments 172
Nonferrous Market News and Prices 174-75
Iron and Steel Scrap News and Prices 177-78
Comparison of Prices by Week and Year 179
Finished and Semifinished Steel Prices 180
Alloy Steel Prices 181
Warehouse Steel and Pig Iron Prices 183
Ferroalloy Prices 184

o o o

Index to Advertisers 223-224

RYERSON STEEL

The Department Store Idea

When you think of a Ryerson Plant, picture a huge department store featuring all kinds and shapes of steel. In place of the ordinary sales personnel, think of a large staff of experienced steel men—a sales department that's been carefully trained to guide your steel purchasing—to see that you get the exact steel you need for the job at hand.

And, when you think of Ryerson Steel-Service, think of a smooth-flowing system of steel supply that eliminates every unnecessary delay between order desk and point of delivery. Think of the most modern steel storing, cutting and shipping methods—methods based on more than a century of performance. And remember that Ryerson Steel-Service functions with the same efficiency and promptness whether your order calls for pounds or tons.

Naturally, today's great demand for steel frequently unbalances our stocks. But if the steel you need is not immediately available, we'll gladly do everything possible to supply you with a practical alternate.

What does it all add up to? Well, just about the last word in steel-buying convenience. And it's all yours when you contact a Ryerson Plant for any steel requirement.

•

Joseph T. Ryerson & Son, Inc. Plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

RYERSON STEEL

The IRON AGE

100 E. 42nd ST., NEW YORK 17, N. Y.

ESTABLISHED 1855

o o o

December 11, 1947

o o o

THOMAS L. KANE
Publisher

o o o

T. W. LIPPERT
Directing Editor

Editorial Staff
News, Markets Editor. T. C. CAMPBELL
Technical Editor........W. A. PHAIR
Metallurgical Editor...E. S. KOPECKI
Machinery Editor ....T. E. LLOYD
Art Editor ....F. J. WINTERS
Associate Editor.........J. R. HIGHT
Associate Editor...H. W. VAN CAMP
Associate Editor.....E. L. SCHIMKO
Editorial Ass't. .....A. D. STOUT, JR.

o o o

Contrib. Editor.....J. S. LAWRENCE

Foreign Editors
England (Contrib.)....F. H. HARLEY
49 Wellington St., Strand, London,
W. C. 2, England
Canada (Contrib.)...F. SANDERSON
330 Bay St., Toronto, Canada
Paris (Contrib.)......PIERRE BENOIT
59 Rue Manin, Paris XIX, France

Regional News and Technical Editors
G. F. SULLIVAN
Pittsburgh 22
814 Park Bldg.

D. I. BROWN
Chicago 3
1134 Otis Bldg.

JOHN ANTHONY
Philadelphia 39
Chilton Bldg.

EUGENE J. HARDY
KARL RANNELLS
GEORGE H. BAKER
Washington 4
National Press Bldg.

W. A. LLOYD
Cleveland 14
1016 Guardian Bldg.

W. G. PATTON
Detroit 2
103 Pallister Ave.

OSGOOD MURDOCK
ROBERT T. REINHARDT
San Francisco 3
1355 Market St.

R. RAYMOND KAY
Los Angeles 28
2420 Cheremoya Ave.

Editorial Correspondents
ROBERT McINTOSH
Cincinnati

L. C. DEAN
Buffalo

G. FRAZAR
Boston

HUGH SHARP
Milwaukee

JOHN C. McCUNE
Birmingham

ROY EDMONDS
St. Louis

JAMES DOUGLAS
Seattle

More Light On Aid

THAT the administration attaches the utmost importance to Congressional and public approval of the Marshall Plan is evident in the sustained flood of propaganda issuing from the capital. It is equally clear, however, that our government is not entirely candid in revealing the real reason for aid or in explaining the consequences. We have been told by eloquent and estimable advocates of aid, both inside and outside the administration, that action is necessary to "preserve democracy and peace in the world," that "we should not allow what is left of European democracy to perish through starvation and Communism," *ad nauseam.*

This approach suggests that the average American is an ignorant and immature ingenue who reads, if at all, without understanding and has no grasp of realities.

The truth is we committed a tragic blunder at the end of the war in assuming that our major foes had been destroyed, that our allies—all of them—were civilized, that they shared with us a desire for peace. Our Army—at the time the greatest fighting force the world had ever known—waited patiently on a prearranged line while the cumbersome Slav moved his military units into strategic positions. We thereupon demobilized our armies. What we did was to throw away our vital aces, the only cards that count in the tough game of power politics. When our diplomats found themselves without effective influence at the conference table, they searched frantically for a substitute and came up with the Marshall Plan. To be honest with ourselves, our hearts are not bleeding for democracy in Europe, nor do we credit the stories of starvation. Our statesmen are simply hoping that the Marshall Plan may keep Russia from pushing us around. We are trying to build up and buy some effective allies.

Similarly, in explaining the effects of European aid on the scale proposed, our leaders have been less than candid. The administration sponsored three voluminous "studies"—the Krug, the Nourse and the Harriman Reports, all telling us that this country can afford the aid without serious inroads upon our resources or damage to our economy. We refrain from commenting on the happy coincidence that all three reports answer "yes" to the question, "Can we afford it?"

What has not been touched is the effect that such aid will have upon the normal and necessary adjustment of our economy to conditions of peace. Our national plant and working personnel are showing signs of fatigue. They have been operating under great strain continuously for 6 years at levels close to capacity. In the absence of the Marshall Plan, we had a fair prospect that we might gradually reduce our strain and effort, that our energies might again accumulate some reserves which could be invoked for emergencies.

To utilize fully the margin of safety in a bridge, to nail the accelerator of a car to the floor and force it, day in and day out, to operate at maximum speed is not good either for the bridge or the car. Similarly, to push an economy to its maximum and keep it there is to invite trouble. That is what the Marshall Plan may do to us. Particularly is this true in agriculture, which is most in need of "relaxation to normal."

Joseph Stagg Lawrence

STEEL . . .

Backbone of Industry

The country's return to normal peacetime operation is dependent, to a large extent, upon how fast the nation's mills can turn out steel for industrial and consumer goods. Inland is running full blast and new construction is under way to meet the seemingly inexhaustible demand for steel shapes, plates, sheets, bars, and other forms . . . doing everything in our power to supply the needs of the market we serve. Inland Steel Company, 38 S. Dearborn St., Chicago 3, Ill. Sales Offices: Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

INLAND
STEEL

BARS • FLOOR PLATE • PILING • PLATES • RAILS • REINFORCING BARS • SHEETS
STRIP • STRUCTURALS • TIN PLATE • TRACK ACCESSORIES

The IRON AGE — NEWSFRONT

Dec. 9, 1947

► The appeals to Washington by various industries to have their particular containers exempted from the forthcoming tin conservation order will go largely unheeded. While Commerce Department admits that the amount of steel saved will be inconsequential, it is not yet discussing the tin situation, which is said to be just as much a reason for the order as is the steel situation.

After the can companies had to forego the lush beer and coffee can business during the war because of restrictions—they returned to production with enthusiasm. Now, with a chance to recoup their losses to glass containers—they will run into a new set of restrictions.

► Anglo-American oil interests are attempting to obtain export permits for shipment of 600,000 tons of steel pipe for Iran to build an 1100 mile pipeline. Recent squabbles on the approval of similar shipments for Saudi Arabia indicate the new proposal will see tough sledding.

► Now that the sights on the freight car program have been moved up to 15,000 cars per month, private builders and railway shops are worrying about the availability of labor for the program, if the steel does arrive.

► New alternate drives, which are being built to permit the use of all ac instead of dc current in the B-36 planes, are being held up for lack of a critical part. The important feature of the new equipment is constant cyclage, regardless of rpm of the engine.

► There will be no hurry on the part of the steel industry to make a wage decision. The longer it takes to reach a decision, the lower the 1948 wage bill will be, providing that there is an increase. This does not preclude a little shadow boxing between now and April when the negotiations are scheduled to begin.

► Practically all the clock industry is becoming interested in powder metallurgy. Large producers are now going into the use of general mechanical parts, in one case including set knobs, spacers, pinions, and hubs.

► It is now possible to buy a packaged powder metallurgy plant for as low as $5000, including a mixer, press, sintering furnace, and atmosphere generator. The plant could produce parts up to ¾ sq in. in cross sectional area of fairly simple shapes; the furnace will handle an average of 20 lb per hour. Iron, brass, or bronze may be used.

► If steel companies want to cut down the gray market, and do a better job than government allocations could do, a few successful prosecutions might help. the basis would be using the mails to defraud to catch alleged brokers who buy for dummy companies though it would not stop diversion by legitimate customers.

► If the U. S. Steel Corp. put the $500 million it has appropriated for modernization and expansion into nothing but integrated expansion it could add some 2.5 million tons to its rated capacity.

While this would delight some branches of the government, the Justice Department would probably charge it with attempting to monopolize the industry.

► Representatives of the Czechoslovakian iron and steel industry have arranged for the delivery of 400,000 tons of iron ore and 40,000 tons of manganese ore from Soviet Russia.

► British steel experts estimate that it will take 1½ years longer to build a completely integrated blast furnace-steel plant-hot strip mill operation under the present system of government controls than would be required without them.

► Car hungry buyers are paying little attention to the old Ford adage "Any color you want—so long as it's black." Kaiser-Frazer says that black has a secondary place among a predominance of choices of blue, green, and gray.

► The most recent crisis appears to have put British industry on an all-out basis. Steel production is up 37 pct over 1938, trucks up 92 pct, tractors 425 pct, freight cars up 40 pct, and merchant shipbuilding up 144 pct.

HARDENABILITY

* * *

By P. R. WRAY
Metallurgical Engineer, Alloy Steels,
Carnegie-Illinois Steel Corp.,
Pittsburgh

* * *

HARDENABILITY is the term commonly used to describe the capacity of a steel to harden. This is of importance to the designer and to the user of alloy steels for attaining either of two objectives; to obtain maximum hardness and strength, or to obtain maximum ductility at the lower strength levels. The microstructures which correspond to optimum properties in these respects are tempered martensite or lower bainite.

Hardenability can be determined from a knowledge of transformation characteristics, particularly from continuous cooling transformation diagrams. This, however, involves an integration of times spent at each temperature level in cooling, and is too laborious for practical determination. Consequently, hardenability is commonly measured by cooling samples or a single sample at a series of different cooling rates and noting the resulting hardness variations and

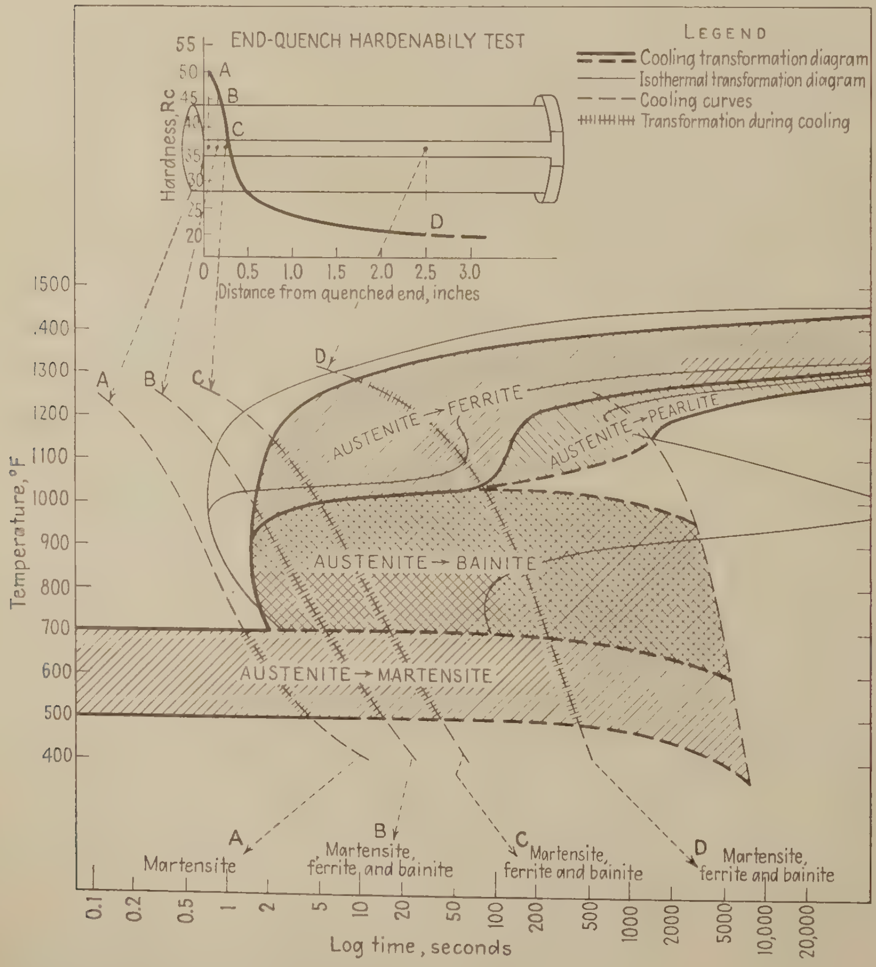


FIG. 1—The specimen and a typical hardness curve (upper portion of figure) are shown illustrating the end-quench hardenability test. Lower portion depicts the continuous cooling transformation diagram for a steel of the 8630 type.

The fundamental concepts of hardenability, and the relationship existing between these concepts and microstructural changes, are explained in this practical article. The derivation and functions of hardenability bands and the means of applying hardenability band data to the solution of steel selection problems are discussed, not only in a general manner, but also from the standpoint of solutions to specific problems. An interesting correlation concerning various quenching conditions and their respective H, or severity of quench values, is also presented.

corresponding variations in mico-structures.

The most convenient, and at present by far the most widely used, method of accomplishing this result is the end-quench test developed by Jominy and Boegehold and standardized by ASTM, SAE and AISI. This test consists of heating a cylindrical specimen, 1 in. in diam and 4 in. in length, at a proper austenitizing temperature, and then quenching in such a manner that a stream of water impinges only on one end of the test bar. Two flat surfaces are then ground longitudinally on the specimen to a depth of 0.015 in. and hardness determination made at 1/16-in. intervals from the quenched end. The specimen and a typical hardness curve are shown in the upper portion of fig. 1, with the results expressed as a curve of hardness values v. distance from the quenched end of the specimen.

The specimen is thus subjected to a series of

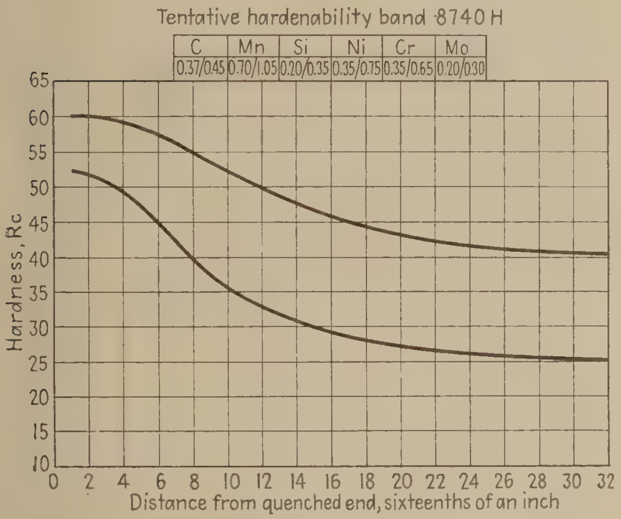


FIG. 2—Hardenability band for 8740H steel.

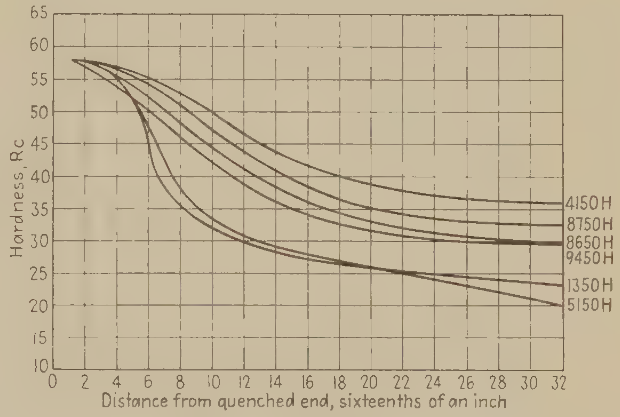


FIG. 3—Minimum hardenability curves for various 0.50 pct C alloy steels.

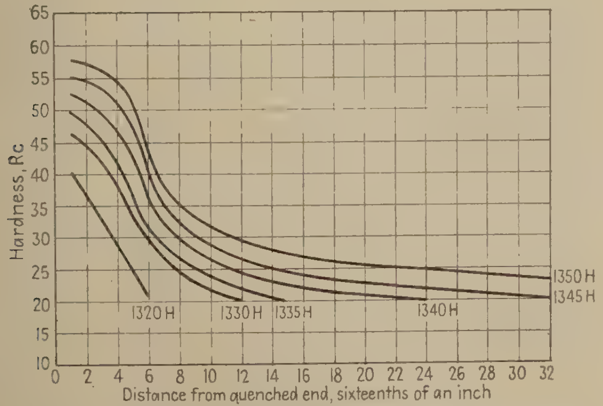


FIG. 4—Families of minimum hardenability curves for the AISI 1300H series with individual curves representing each carbon level.

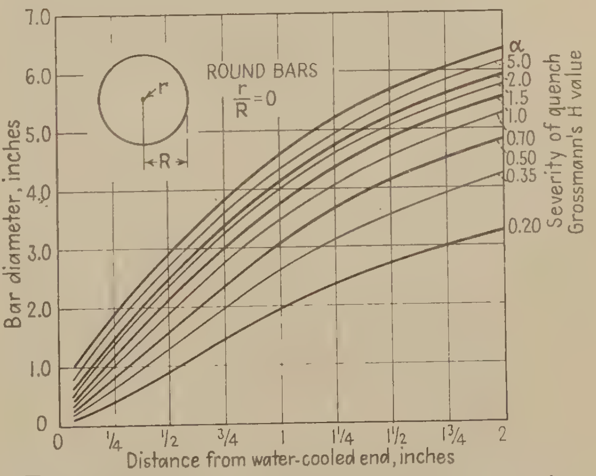


FIG. 5—Curves for estimating the distance from the water-cooled end of an end-quench test that correspends to any location in a round bar (r/R = 0.0). 0.0).

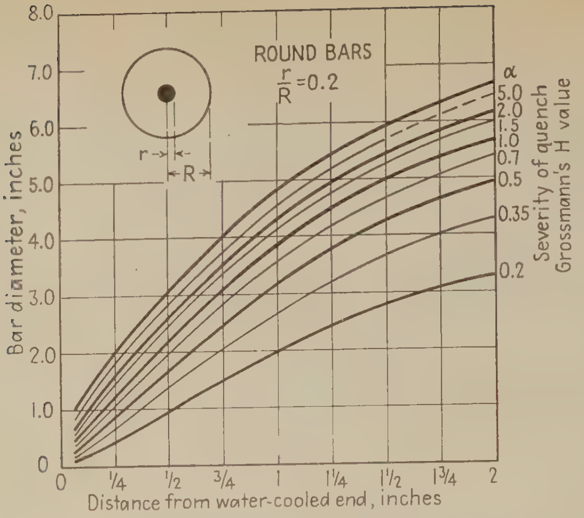


FIG. 6—Curves for estimating the distance from the water-cooled end of an end-quench test that corresponds to any location in a round bar (r/R = 0.2).

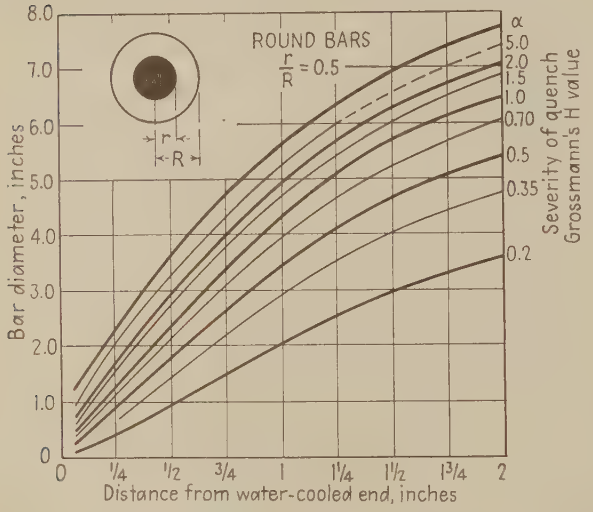


FIG. 7—Curves for estimating the distance from the water-cooled end of an end-quench test that corresponds to any location in a round bar (r/R = 0.5).

TABLE I

Cooling Rates at Various Locations on Standard End-Quench Test Bar

Distance from Quenched End, In.	Cooling Rate, °F per sec at 1300°F
1/16	489
⅛	307
3/16	195
¼	124
5/16	77.2
⅜	56.3
7/16	41.9
½	32.3
9/16	25.0
⅝	21.4
11/16	19.5
¾	16.3
13/16	14.5
⅞	12.4
15/16	11.5
1	10.0
1¼	7.0
1½	5.1
1¾	4.0
2	3.5

TABLE II

H or Severity of Quench Values for Various Quenching Conditions

H Value	Quenching Condition
0.20	Poor oil quench—no agitation
0.35	Good oil quench—moderate agitation
0.50	Very good oil quench—good agitaion
0.70	Strong oil quench—violent agitation
1.00	Poor water quench—no agitation
1.50	Very good water quench—strong agitation
2.00	Brine quench—no agitation
5.00	Brine quench—violent agitation
∝	Ideal quench

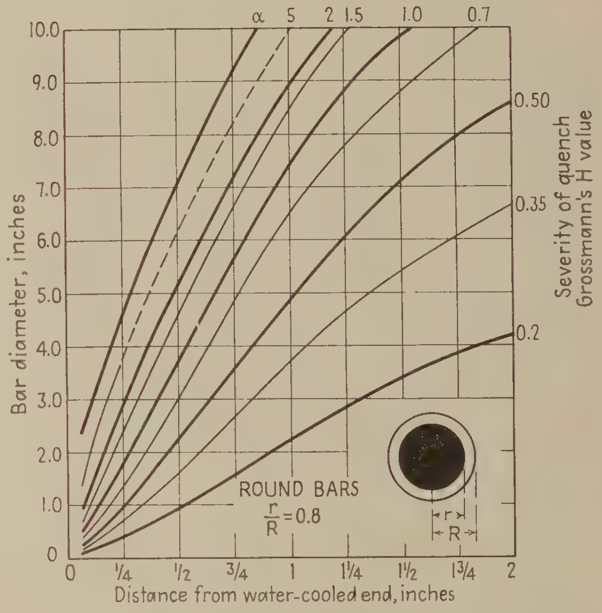


FIG. 8—Curves for estimating the distance from the water-cooled end of an end-quench test that corresponds to any location in a round bar (r/R = 0.8).

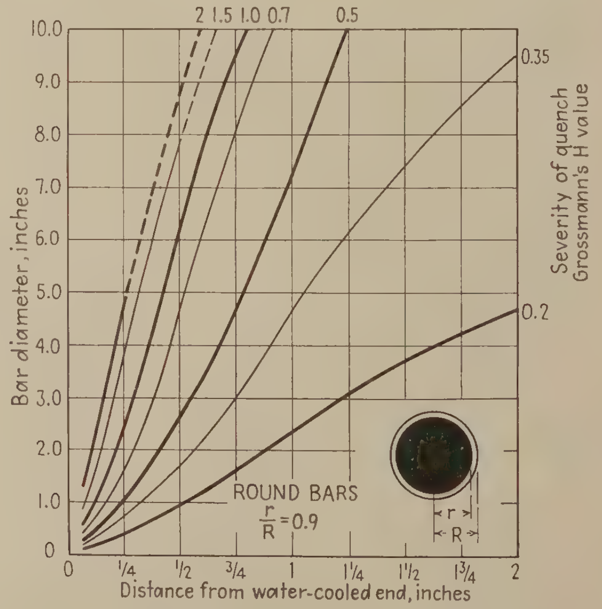


FIG. 9—Curves for estimating the distance from the water-cooled end of an end-quench test that corresponds to any location in a round bar (r/R = 0.9).

cooling rates varying continuously from a rapid water quench at the quenched end to an air cool at the opposite end. The lower section of fig. 1 which depicts the continuous cooling transformation diagram for an alloy steel of the 8630 type, on which the cooling rate curves representing cooling rates at selected locations along the end-quench test bar have been superimposed, will serve to clarify the relationship between this method of hardenability measurement and the transformation behavior.

Upon analyzing the microstructural results obtained by cooling at these various rates, it will be seen that rate A, which represents the rate nearest the quenched end, is faster than the critical cooling rate and will result in transformation to martensite, while rates B, C, and D all result in transformation to various mixtures of ferrite, bainite, and martensite. It will further be noted that a very slow cooling rate, well beyond the usual measured range of the end quench test, is necessary to obtain pearlite in this steel.

Although hardenability is usually expressed in terms of hardness values, or hardness changes, it is the microstructural changes reflected by those hardness values which are of importance to the properties of steel. Since alloying elements in general delay transformation in the pearlite and bainite regions, their addition to steel permits the formation of martensitic microstructures with slower rates of cooling, which is another way of saying that alloying elements increase hardenability. Alloy steels, therefore, can be heat treated to the desirable tempered martensitic microstructure in heavy sections, or with less drastic quenching and hence less distortion and cracking in light sections, both factors which must be given careful consideration in designing for production.

Hardenability Bands and Their Application

Because of the popularity of the end quench test, SAE and AISI jointly established minimum and maximum end quench hardenability curves known as *hardenability bands* for most of the constructional alloy steels. These bands or hardenability limits, typified by fig. 2, which shows the hardenability band for 8740H steel, are based on the analysis of data collected from hundreds of heats of each grade of steel. Steels so studied are distinguished from the usual AISI-SAE grade designation by the suffix *H* to denote steels produced to a hardenability specification. Introduction of these steels and their hardenability bands has presented a new type of steel specification wherein hardenability may be specified directly, with the chemical composition, grain size, etc., being of secondary importance. The complete list of H steels and the corresponding hardenability bands together with recommended testing procedure is set forth in "AISI-SAE Contributions to the Metallurgy of Steels"[1].

For convenience in using hardenability bands for the selection of steels, as will be explained, the following data are included:

(1) Minimum curves from published bands of various 0.50 pct C alloy steels,[1] fig. 3; (2)

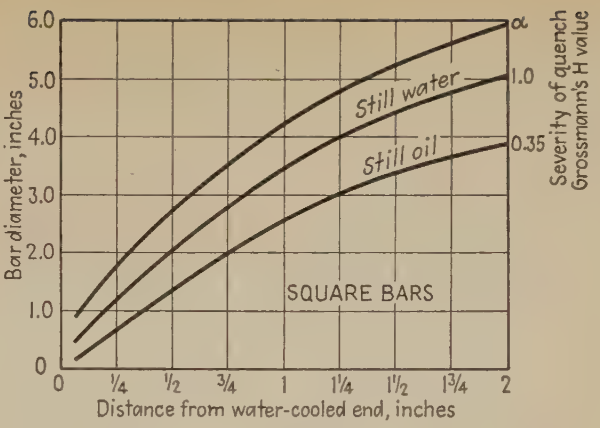


FIG. 10—Curves for estimating the distance from the water-cooled end of an end-quench test that corresponds to any desired location in square bars.

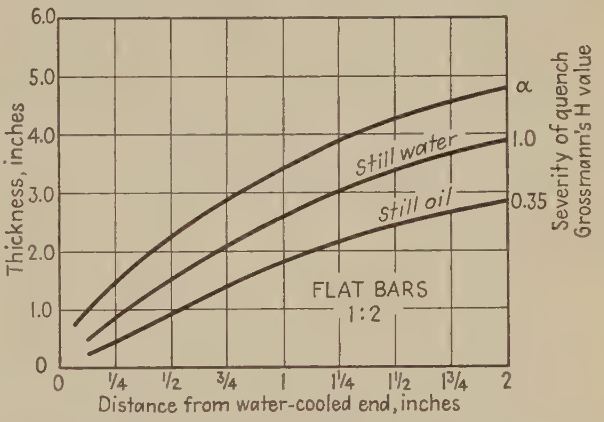


FIG. 11—Curves for estimating the distance from the water-cooled end of an end-quench test that corresponds to any desired location in flat bars (1:2).

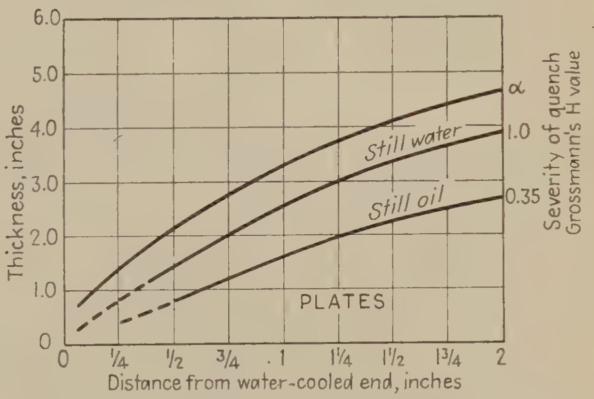


FIG. 12—Curves for estimating the distance from the water-cooled end of an end-quench test that corresponds to any desired location in plates.

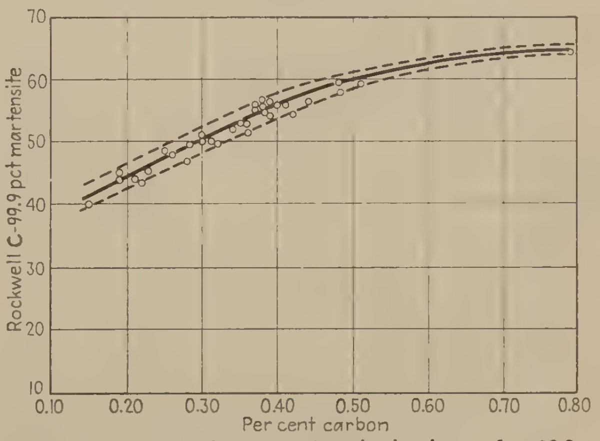


FIG. 13—Curves for estimating the hardness of a 99.9 pct martensitic structure for various carbon contents.

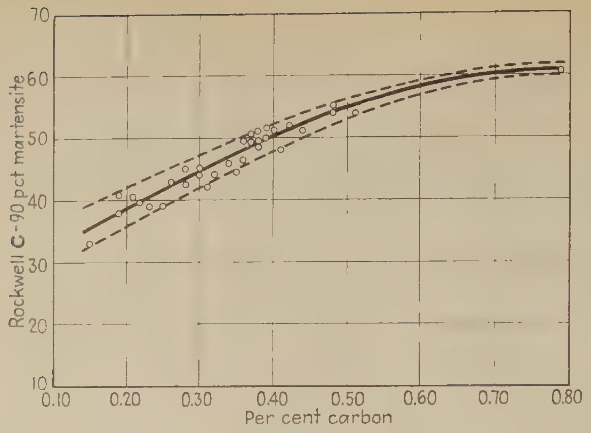


FIG. 14—Curves for estimating the hardness of a 90 pct martensitic structure for various carbon contents.

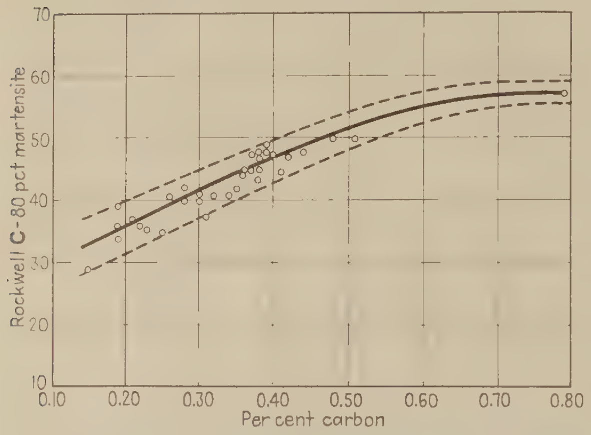


FIG. 15—Curves for estimating the hardness of an 80 pct martensitic structure for various carbon contents.

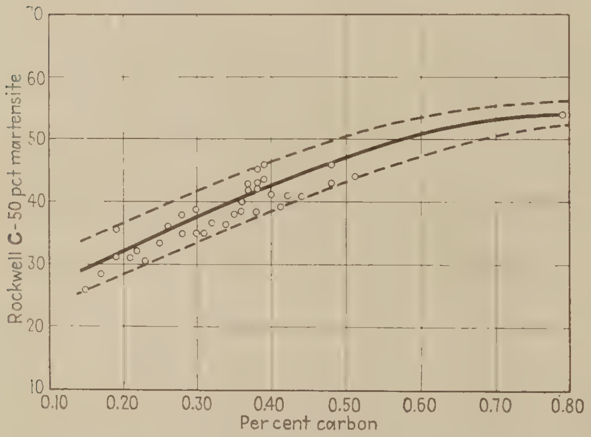


FIG. 16—Curves for estimating the hardness of a 50 pct martensitic structure for various carbon contents.

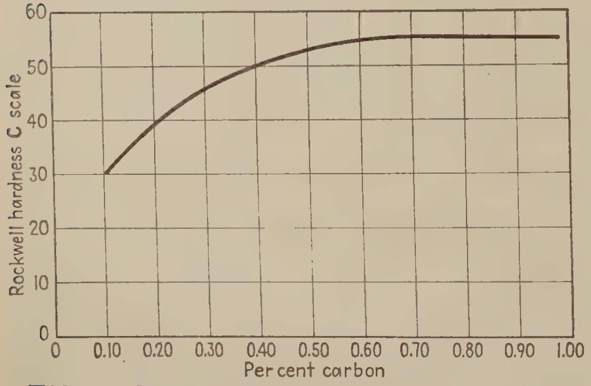


FIG. 17—Curve of "as-quenched hardness for best tempering properties v. carbon content" from work of Boegehold.[6]

families of minimum curves from published bands of AISI 1300H series, with individual curves representing each carbon level,[1] fig. 4; (3) cooling rates in °F per sec at 1300°F for each distance along the end quench bar,[2] table I; (4) H or severity of quench values for various quenching conditions,[3] table II; (5) curves by Lamont[4] for estimating the distance from the water-cooled end of the end-quench test that corresponds to any desired location in rounds, squares, or flats of simple shape, figs. 5-12; (6) curves by Hodge and Orehoski[5] for estimating the hardness of a given type of microstructure when the carbon content is known, figs. 13-16; (7) curve of "as-quenched hardness for best tempering properties v. carbon content" from work of Boegehold,[6] fig. 17.

Usefulness of Hardenability Bands

Estimating cross-sectional hardness curves of rounds quenched in moderately agitated oil ($H = 0.35$). The familiar cross-sectional hardness curves (commonly designated as *U* curves) can be readily derived from the H-bands as shown in the following example:

Using the minimum hardness values from the 8740H band, depicted in fig. 2 and the conversion curves, figs. 5-9, the familiar U curves of cross-sectional hardness values have been derived as shown in fig. 18. Similar charts can be derived for all H steels.

Estimating hardness v. size (mass effect) curves of rounds quenched in moderately agitated oil ($H = 0.35$). Mass effect curves of hardness v. size of various diameter rounds quenched in a known manner can be developed from the H-bands by use of conversion charts of figs. 5 to 9 inclusive.

Using the same approach as in the preceding example, figs. 19 and 20 show the minimum as-quenched hardness at midradius and center locations of various size rounds of typical 0.40 pct C alloy steels quenched in moderately agitated oil calculated from the minimum hardness curve for the respective H steels.

Selection of steel or steels to meet a known hardness requirement in production heat treating.

(1) When minimum quenched hardness for a given location in part is known. When the cooling rate at the given location is known, the reference distance on the end-quench test bar can be located by using table I. If, as is usually the case, this cooling rate is not known and the part is simply in shape (round, square, flat), table II and figs. 5 to 12 can be used to locate the reference distance corresponding to the desired location in the part being heat treated.

If a minimum hardness of 45 Rc is desired at the midradius location of a 1 in. round (¼ in. from surface, $r/R = 0.5$) when quenched in oil with no agitation ($H = 0.2$), fig. 7 indicates that the reference distance is ½ in. on the end-quench test bar; therefore, the specification should be 45 Rc at ½ in. Using the minimum curves of the standard H-bands, it will be seen that the following grades will meet this requirement; 4142H, 8645H, 8745H, and 9450H. The grade finally selected will then be the one which will satisfy the other requirements such as annealing, machining, welding, etc., and which will show the greatest overall economy.

(2) When a certain microstructure is desired for a given location in a part. There will be instances where the user will want a certain type of microstructure upon quenching to assure the attainment of desired properties in the heat-treated part. For such applications, figs. 13 to 16 will give the approximate hardness corresponding to the desired microstructure.

If a user desires an as-quench microstructure of at least 90 pct martensite in a 0.50 pct C alloy steel, from fig. 14 it will be seen that this corresponds to a hardness of approximately 53.5 Rc. Therefore, the reference hardness for selecting the grade of steel to be used is 53.5 Rc. Further, suppose this user contemplates oil quenching (strong agitation, $H = 0.50$) a 1½ in. round to obtain this 90 pct martensitic microstructure at the center of the round ($r/R = 0.0$). Using fig. 5 the reference distance on the end-quench test bar is 15/32 in. The user should, therefore, specify Rc 53.5 at 15/32 in. min to assure at least 90 pct martensitic microstructure. Using the family of minimum curves shown in fig. 3 it will be seen that a steel having hardenability such as 4150H is needed to meet the desired requirement.

(3) When user has no experience on which to base a selection of desired hardness or microstructure. Cases arise where the user wants to select a steel that will harden sufficiently to yield the optimum properties after quenching and tempering, but has no experience as to the hardness required. For guidance in such cases, fig. 17 can be used for determining the required minimum as-quenched hardness value (which incidentally would correspond to the 90 pct martensite microstructure desired in the previous example).

Once a steel grade is selected, the H steels offer the user a means for specifying controlled hardenability. Users of H steels have experienced more uniformity of hardness in finished parts together with fewer rejections or retreatments, which illustrates the progress made in recent years through the understanding of hardenability.

References

[1] AISI-SAE Contributions to the Metallurgy of Steels, No. 11, June 1947.

[2] A. L. Boegehold and E. W. Weinman, "Cooling Rates of Flates and Rounds," Metal Progress Data Sheet, January 1947.

[3] Private communication from M. A. Grossman.

[4] J. L. Lamont, "How to Estimate Hardening Depth in Bars," THE IRON AGE, Oct. 14, 1943.

[5] J. M. Hodge and M. A. Orehoski, "Relationship Between Hardenability and Percentage of Martensite in Some Low Alloy Steels," AIME, TP 1800, 1945.

[6] A. L. Boegehold, "Selection of Automotive Steel on the Basis of Hardenability," SAE Journal, October 1944.

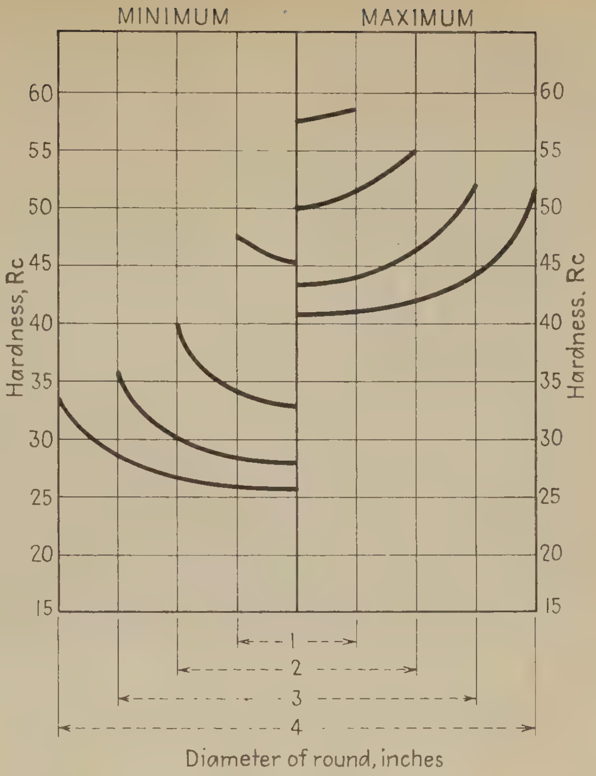


FIG. 18—U-curves of cross-sectional hardness values for an 8640H steel as derived from the minimum hardness values from the 8740H band in fig. 2 and the conversion curves, figs. 5-9.

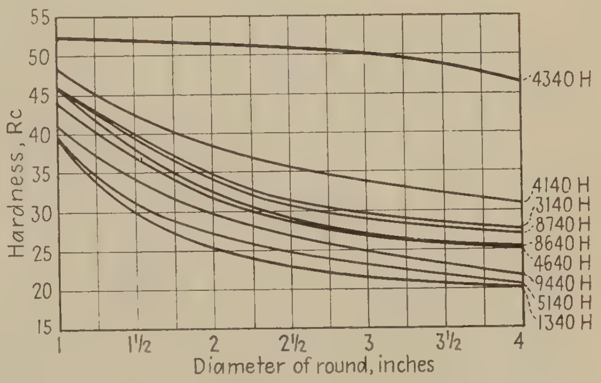


FIG. 19—Minimum midradius hardness values for round bars of typical 0.40 pct C H steels as quenched in oil ($H = 0.35$).

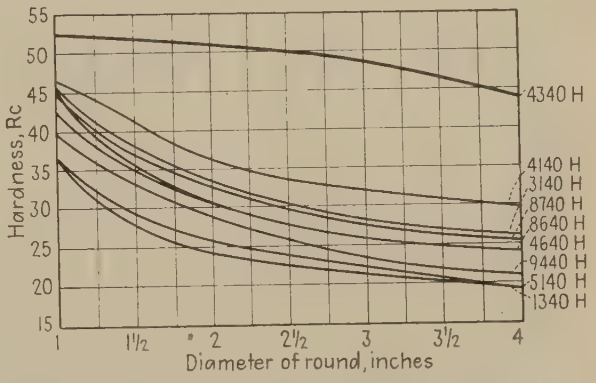


FIG. 20—Minimum center hardness values for round bars of typical 0.40 pct C H steels as quenched in oil ($H = 0.35$).

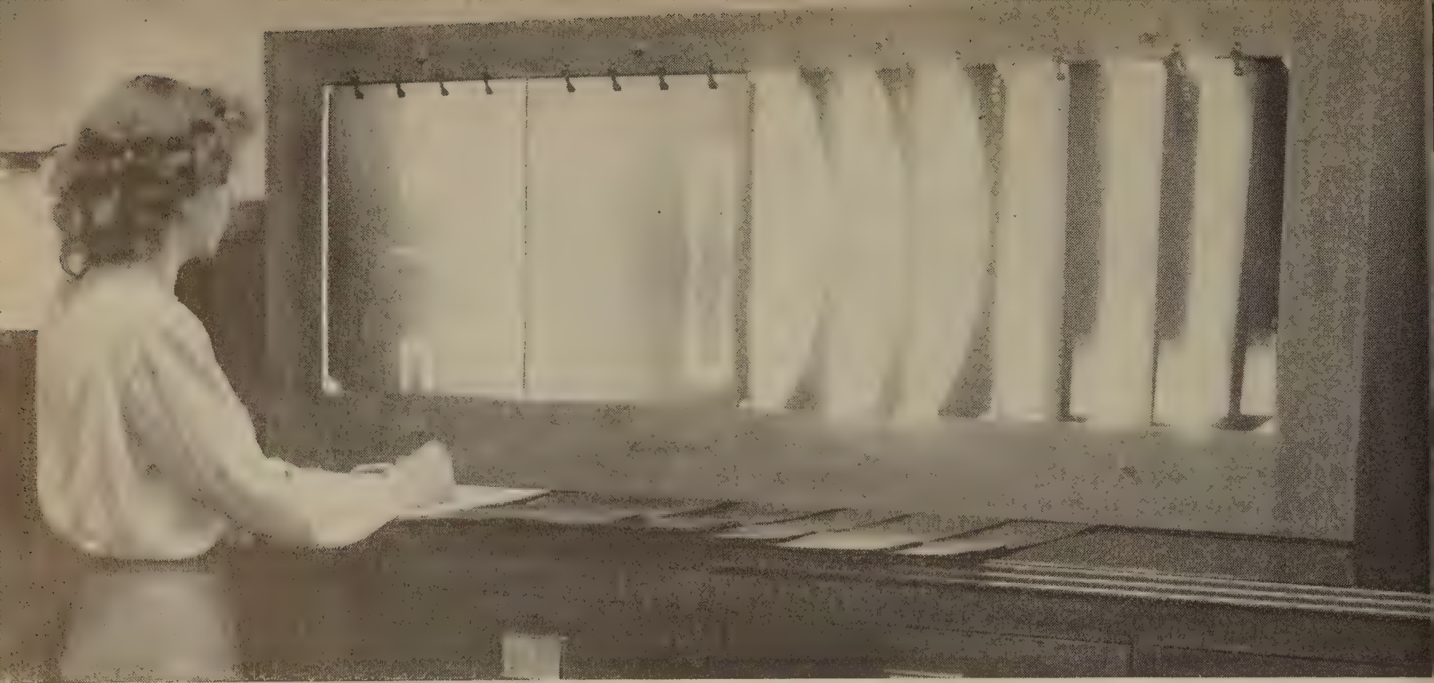


FIG. 1—Installation for viewing and checking X-ographs of aluminum alloy jet engine castings. Note the large size and clarity of the films.

. . . X-Ray Inspection of

° ° °

W. A. MADER
Chief Metallurgist,
Oberdorfer Foundries, Inc.,
Syracuse

° ° °

Complex aluminum alloy castings for aircraft jet engines must meet stringent quality requirements and demand the utmost in casting perfection. This article describes the application of X-ray inspection methods to these castings and the benefits derived therefrom. X-ographs were used in the development of optimum casting procedures, served as a guide in the repair of imperfect pieces, and reduced machine shop losses due to foundry defects to below 0.5 pct.

A CONSIDERABLE part of the GE TG 180 jet engine powering the Republic Thunderjet and other similar fast planes consists of high quality aluminum castings.

Oberdorfer Foundries, working through various subcontractors of the Army Air Forces, has been the major producer of these castings since the inception of jet engines in the U. S. At the time this article was written these castings were being made for Allison Div., General Motors Corp. and Thompson Products, Inc.

The castings are made of two different aluminum alloys, having the chemical compositions indicated in table I.

Castings made from B12G21J alloy are solution treated and aged for maximum strength and are used in the highly stressed housings. Castings made from B12G5A are used in oil seals and other places where good bearing qualities are required. These castings undergo a stress relief heat treatment.

Although the B12G21J alloy is readily castable, the complexity of the castings and the stringency of the quality requirements entailed major problems in the development of satisfactory casting procedures. The B12G5A alloy is far more difficult to cast as it is subject to segregation and feeding problems because of the tin and nickel content. However, the B12G5A castings are also relatively simple and once the proper gating and feeding methods were found, little trouble was experienced in producing these castings.

Oberdorfer Foundries has X-ray laboratory facilities for the inspection of both bronze and aluminum alloy castings. These facilities include a GE X-ray Corp. OX250 machine (250,000 v, 15 milliamperes), dark room equipment, film filing space and film viewers. A viewing, checking and filing installation is shown in fig. 1.

This X-ray equipment is normally used in the development of casting procedures by X-raying sample castings made under trial procedures. After satisfactory trial castings have been obtained, percentage checks are made on the production runs. X-ray inspection is also used to check the quality of weld repairs on castings.

Various types of aluminum alloy castings required for the jet engines are shown in fig. 2. These castings vary in weight from about 1 to 350 lb in the finished condition. The first step in the development of casting procedures for them was to make trial castings. After it was considered that the trial castings were satisfactory, from the standpoints of X-ray examination and customer's approval, production runs were made and the first 25 castings of each pattern were X-ray inspected. If these 25 castings passed X-ray inspection requirements, a percentage check was continued on all future production. If any corrections were necessary, or engineering changes altering casting characteristics were made, the above procedure was repeated. This method greatly facilitated development of the proper casting techniques and resulted in low foundry and machine shop losses.

GE specified by blueprint the method of making weld repairs on each type B12G21J casting and these blueprints were followed by the AAF and subcontractor inspection departments. All major welds were required to be checked by X-ray examination. The representative films showing the quality of the weld repair, properly identified and accompanied by an affidavit listing pertinent information, were forwarded to the customer. X-ray procedure was conducted ac-

Aluminum Jet Engine Castings

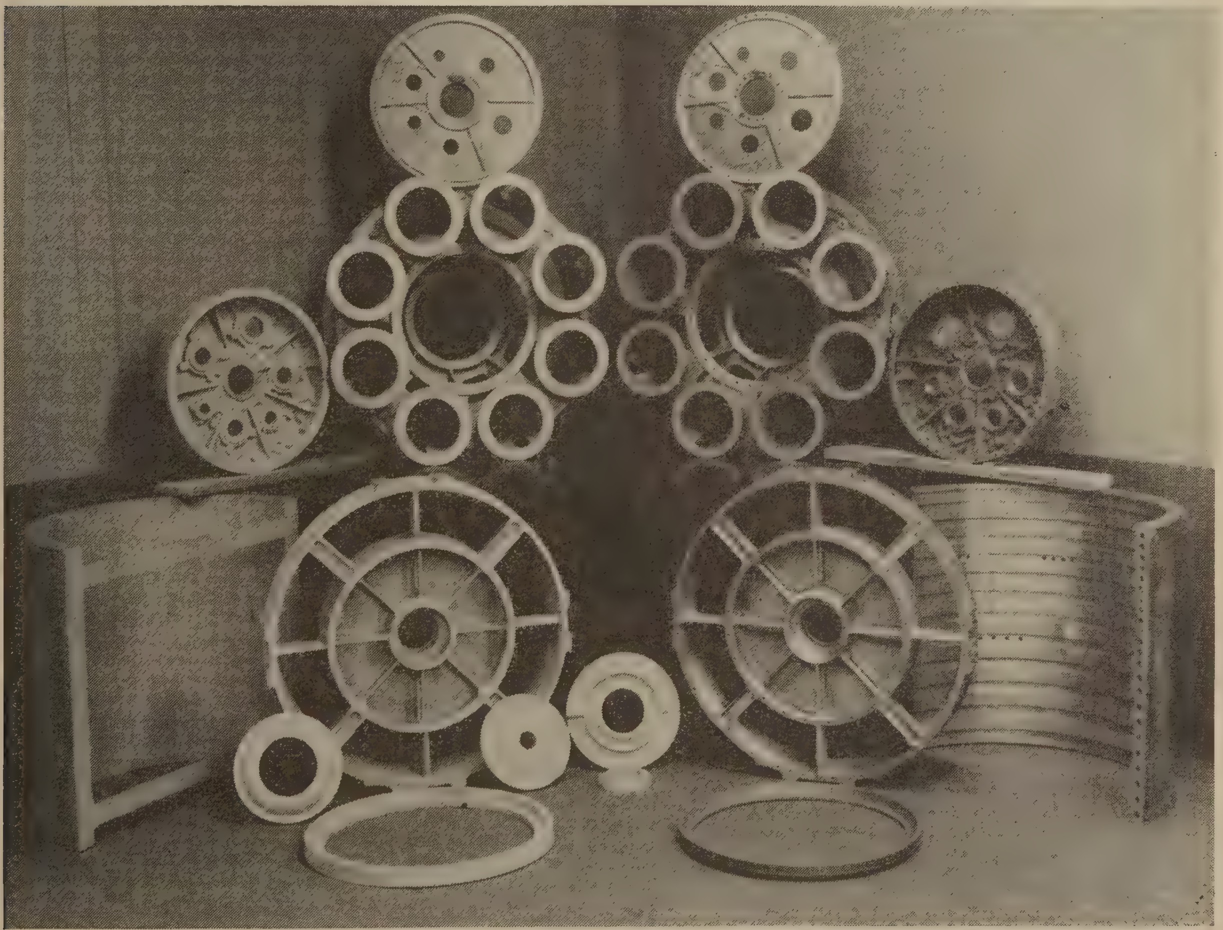


FIG. 2—Various types of aluminum alloy jet engine castings. Castings on left are ready to be shipped from the foundry. Those on the right have been machined.

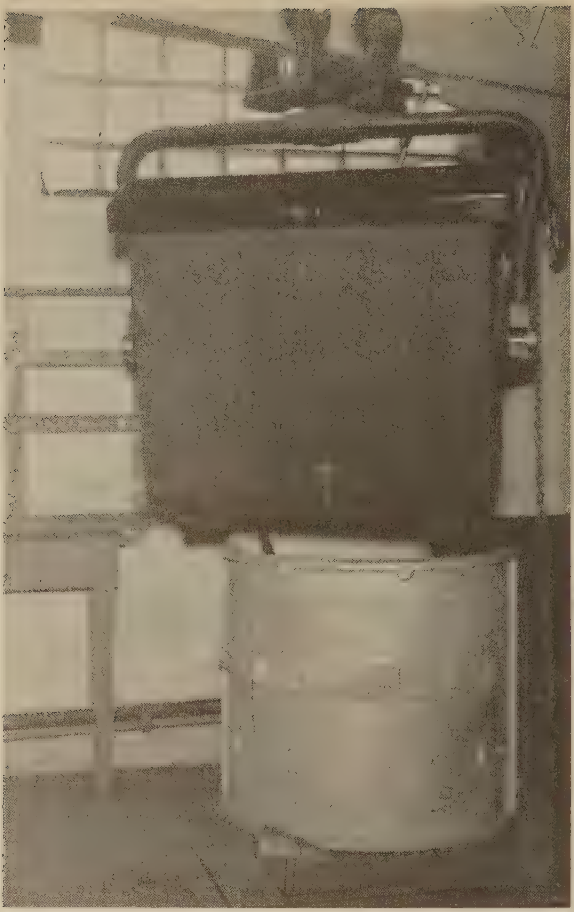


FIG. 3—X-raying an aluminum alloy jet engine stator casting. Note the use of the Army Air Corps type penetrometer.

cording to Army-Navy Aeronautical Specification AN-I-26. This, among other requirements, requests that the films show better than 2 pct sensitivity using the pierced strip-type penetrometer. A very satisfactory repairing procedure was developed and allowed the use of slightly imperfect castings with no reduction of service life, after the welding of small defects.

In the case of the stator casting shown being X-rayed in fig. 3, the customer, Thompson Products, felt that the machining costs and stringent inspection standards warranted 100 pct X-ray inspection. Therefore, each casting was X-rayed to check for internal foundry defects in all areas of the casting. Two of these stator castings are bolted together before machining to form a cylinder, then the castings are bored removing about ¼ in. of metal from the internal circumference of each casting, and dovetail slots are machined in the internal perimeter. These dovetail slots hold aluminum rings in which the compressor blades are inserted. Tolerances are such that if one of the pair of stator castings in an assembly must be rejected, due to a foundry defect uncovered during machining, the mate must also be scrapped. These castings since they are relatively uniform in cross-sectional area over their entire length, are subject to center-line shrinkage, a type of major shrinkage which appears in the center of the casting, seldom breaks through the surface, and which would generally be uncovered during the machining of the dovetail slots. Also, small air bubbles may be trapped in the metal and appear in the flanges and bosses. No evidence of these bubbles is generally visible on the surface of the casting.

A total of 16 X-ray films (6-14 x 17 in. and 4½-10 x 17 in. film sizes) was used to cover the entire area of each casting. Eastman type X-ray film was used for all inspection purposes, this type film having been found to give the necessary sensitivity with good speed when correct techniques were used. Approximately 2000 stator castings have been X-rayed to date.

The GE repair drawing for the stator casting does not allow welding on the inside of the casting, no more than five welds per casting are permitted, and no single weld repair can be more than 2 in. diam.

Standards for X-ray inspection of the stator castings were set up through consultation between the laboratories of the Oberdorfer Foundries and Thompson Products laboratories who correlated machine shop losses due to foundry defects with X-ographs of castings. Oberdorfer Foundries laboratories examined the X-ographs of the castings before they were shipped, rejecting those that they felt did not meet X-ray standards, or assigning them to be welded as permitted by the GE repair drawing. All X-ographs on castings to be shipped were forwarded to Thompson Products laboratories who also checked the X-ographs before the castings were allowed to enter the machine lines.

One hundred percent X-ray inspection of the stator castings reduced machine shop losses due to foundry defects to below 0.5 pct and reduced the total foundry scrap including X-ray rejections to below 5 pct. These low scrap losses for this type casting were effected in the foundry through alterations in foundry technique made possible by close cooperation of the foundry and engineering personnel with the laboratories. Further reductions in scrap losses on this casting are still considered possible with better pattern and molding equipment.

X-ray inspection contributed greatly to the maintenance of similar high quality standards and low scrap losses in the other types of these aluminum jet engine castings even though they were difficult to cast and the quality standards were very severe.

The same methods of X-ray inspection used on these aluminum jet engine castings have been

TABLE I

Chemical compositions of the two aluminum alloys used for the jet engine castings

	GE Alloy B12G21J (Al 356T6)	GE Alloy B12G5A
Silicon	6.5–7.5 pct	
Magnesium	0.2–0.4	
Tin		7.5–11.0
Nickel		2.0– 4.0
Copper	0.20 max	
Manganese	0.10 max	
Iron	1.00 max	
Zinc	0.05 max	
Titanium	0.20 max	
Other impurities	0.05 max	
Aluminum	balance	85.0–91.0

applied at Oberdorfer Foundries to other castings of a critical nature, cast from both aluminum and copper alloys, with equally satisfactory results both to the buyer and the producing foundry.

Companies buying castings should consider these applications of X-ray inspection and make use of this valuable tool in order to reduce machining losses which are extremely expensive due to loss of the value of the machined casting and also because of the very costly delays in production involved. While X-ray inspection castings demand premium prices to defray the cost of X-raying, the results, as shown by its application to the castings described in this article, justify their greater use.

Radius-Truing Centerless Grinder Wheels

IN THE increasing application of centerless grinding to form work, difficult pieces are occasionally encountered which necessitate not only an accurate radius, but, in some cases a radius or arc that must blend accurately with a taper or form. Examples of such requirements are automotive valves, rock drills, machinists' hammers, and other such items.

A radius-truing device, designed by Arthur Scrivener, Ltd., Birmingham, England, for incorporation with the form-truing attachment, enables any of the radii shown in fig. 1 to be generated on a grinding wheel. Generally, radius truing is seldom needed on the opposite control wheel, as even the ball shown in fig. 1b is controlled from a straight control wheel. In the case of work requiring such a radius as that shown in fig. 1c, the work would be controlled by twin controlled wheels on each side of the radius.

The new truing device is shown in fig. 2 and consists essentially of a C-shaped diamond carrier with trunnions at each end. The rear surface of this carrier is circular, presenting a substantial support against the similar concave surface of the exterior C-shaped base in which it is mounted. By means of the handle and adjustable gate shown in the photograph, the diamond carrier is movable through 180°. This adjustment permits corrections to compensate for the varying relations of the face of the diamond to the center about which the radius is struck.

Mounted on the barrel of the normal form-truing attachment, this device can be used to true the wheel to any desired taper or form from the usual former plate until, in its traverse across the wheel, the diamond reaches a predetermined stop. At this point, the traverse of the slide is arrested, and the required radius or arc is generated by the movement of the hand lever operating the radius-truing device. A true arc is thus generated as an emergence or continuation of the form already produced on the wheel from the former plate. No breakdown of setup or opening up of the wheels is required to bring it into operation.

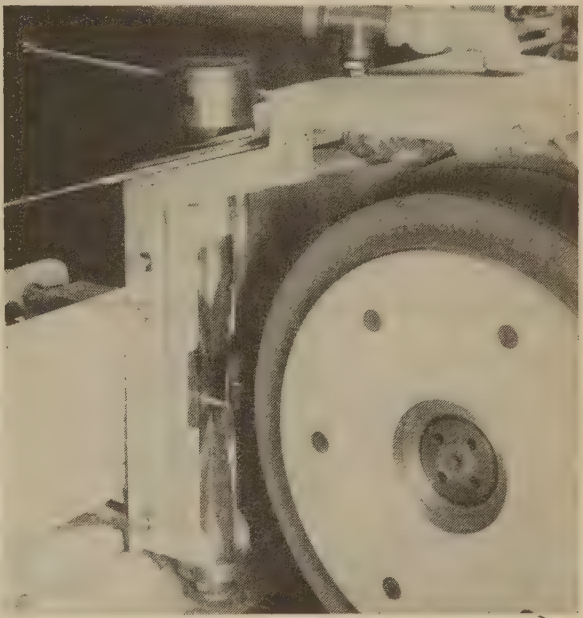


FIG. 1—Examples of radii that can be generated with the Scrivener attachment.

The attachment enables convex radii to be generated on the wheel up to ¾ in. or concave radii up to about 1½ in. While the device theoretically makes it possible to generate a complete half-circle on the wheel, either concave or convex, in actual practice it would be useless to do this because of the rapid wheel breakdown at the sides of the half-circle, with the result of quick size loss. Further, in producing the half-circle, no longitudinal cut could be effected on the wheel because of interference of the holder and because the cutting facet of the diamond is no longer in position for applying a cut in this direction.

Thus, the emergence angle of the radius is largely a matter of compromise, and the radius that can be practicably generated on the wheel would be limited to the arc between a 90° angle for convex form or about 120° for a concave form.

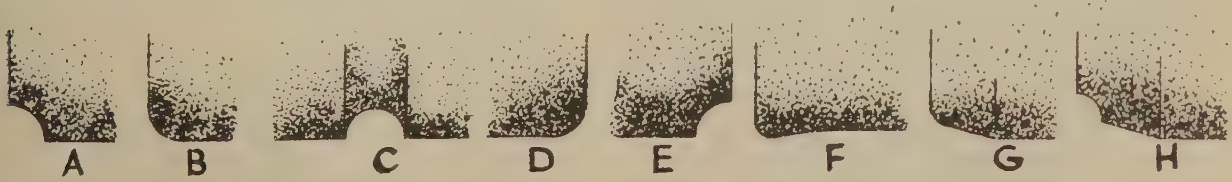


FIG. 2—The Scrivener radius-truing attachment for centerless grinders.

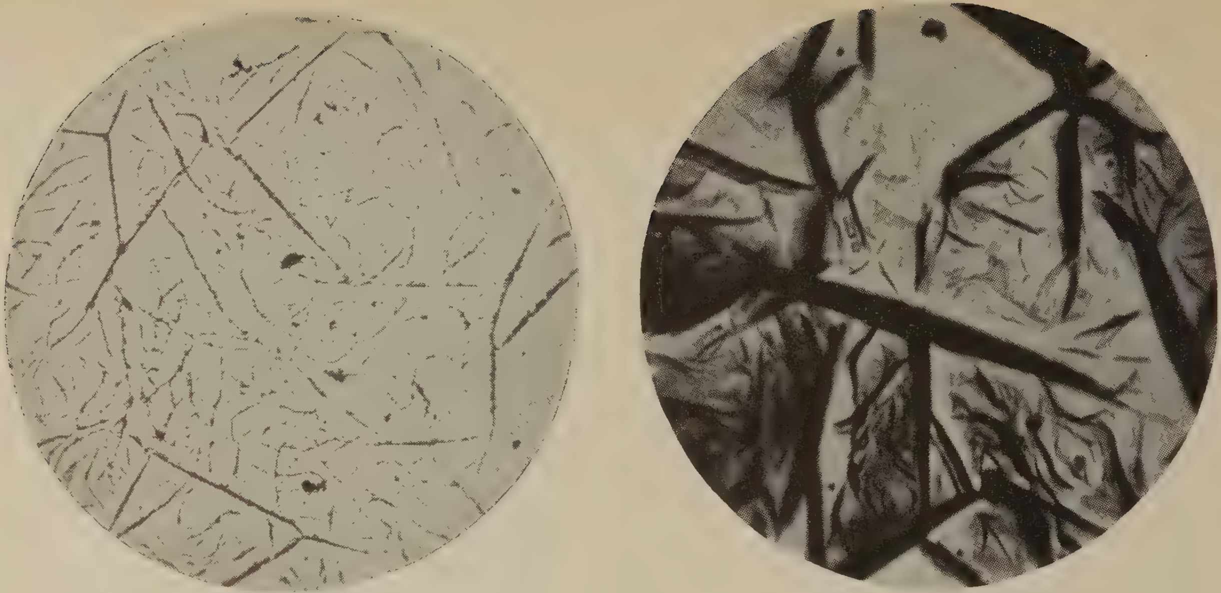

—A— —B—

FIG. 1—A conventional photomicrograph of gray cast iron is shown at *A*, while at *B* is a microradiograph of the same specimen. Both illustrations 40X.

Microradiography

BY F. W. Von BATCHELDER
Head, X-Ray Section,
Metallurgy Div.,
and
J. H. SCHAUM
Research Metallurgist,
Naval Research Laboratory,
Washington

Microradiography, a technique in which radiographs of structures of materials are examined under magnification, offers the metallographer many interesting possibilities in enlarging the study of microconstituents of metals. In this article, the author briefly describes the method of producing microradiographs and, by presenting microradiographs and photomicrographs of identical structures, illustrates the basic differences in results observed by the two procedures.

MICRORADIOGRAPHY is a technique in which X rays are directed through a very thin specimen onto a fine grained photographic film and the image examined under magnification. Microradiography provides a projection of the three-dimensional structure of the specimen onto a plane. In this technique samples less than 0.005 in. thick are preferred and are prepared for examination by grinding and polishing.[1] Aluminum and magnesium samples may be as thick as 0.010 in.

Microradiography distinguishes between various microconstituents having different degrees of X ray absorption. The X ray absorption of a specimen depends upon its thickness, its density, and most important upon the atomic elements in the material. In traversing matter X rays are absorbed in accordance with Lambert's law, which is expressed in an exponential equation $I = I_0 e^{-kpx}$ where I is the intensity of the X rays after passing through a specimen of thickness x and density p, I_0 is the intensity of a homogeneous X ray beam incident on the specimen, and k

---

[1] *A.F.A. preprint No. 47-32, "Microradiography of Gray Cast Iron," by E. I. Salkovitz, J. H. Schaum, and F. W. von Batchelder.*

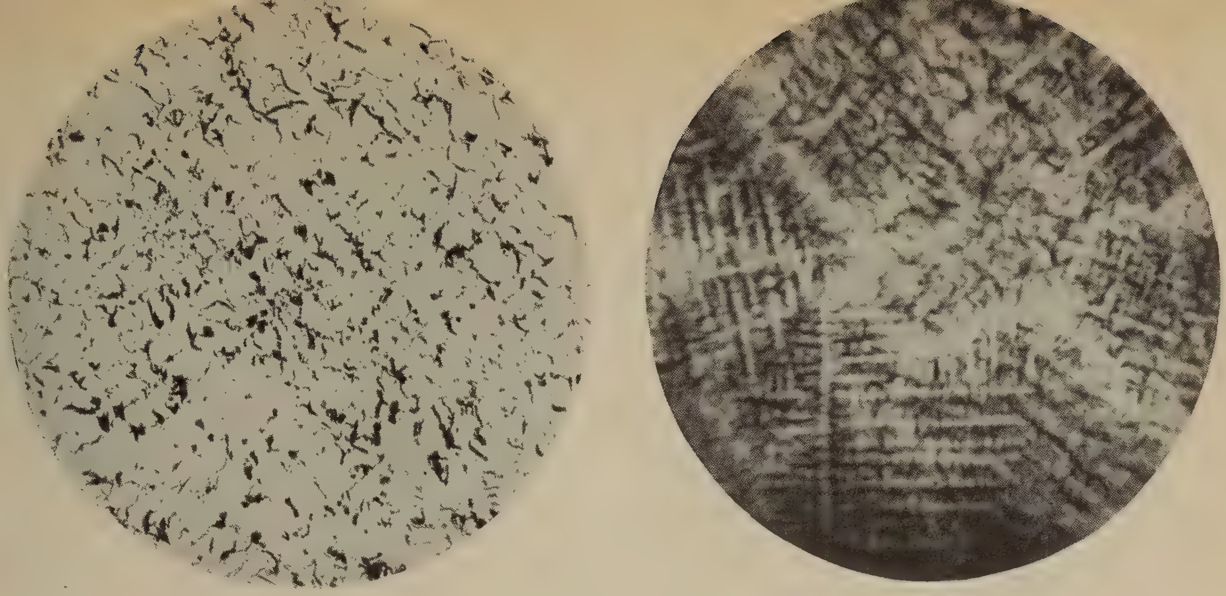

—A— —B—

FIG. 2—The photomicrograph at *A*, of gray cast iron (50X, unetched), shows the type E graphite pattern. A microradiograph at *B* (30X) highlights the dendritic manner in which the metal solidified and the interdendritic pattern of the graphite distribution.

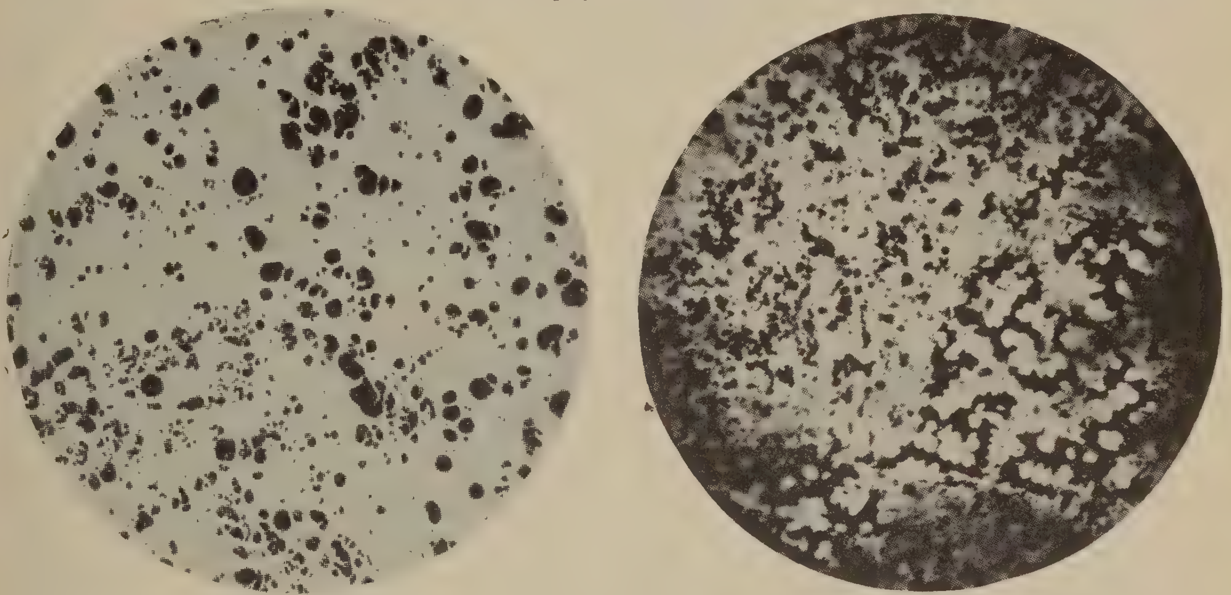

—A— —B—

FIG. 3—A photomicrograph of malleable iron (40X, unetched) is shown at *A*; a microradiograph of the same specimen is shown at *B* (40X).

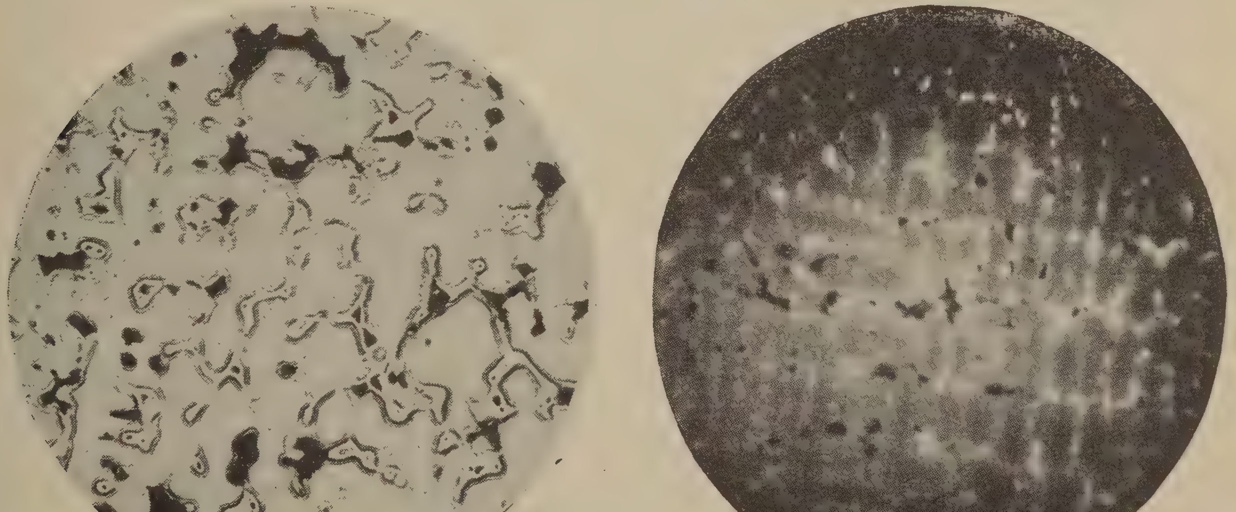

—A— —B—

FIG. 4—A photomicrograph of Navy M bronze is shown at *A* (40X, potassium dichromate etch), compared with a microradiograph of the same specimen at *B* (40X).

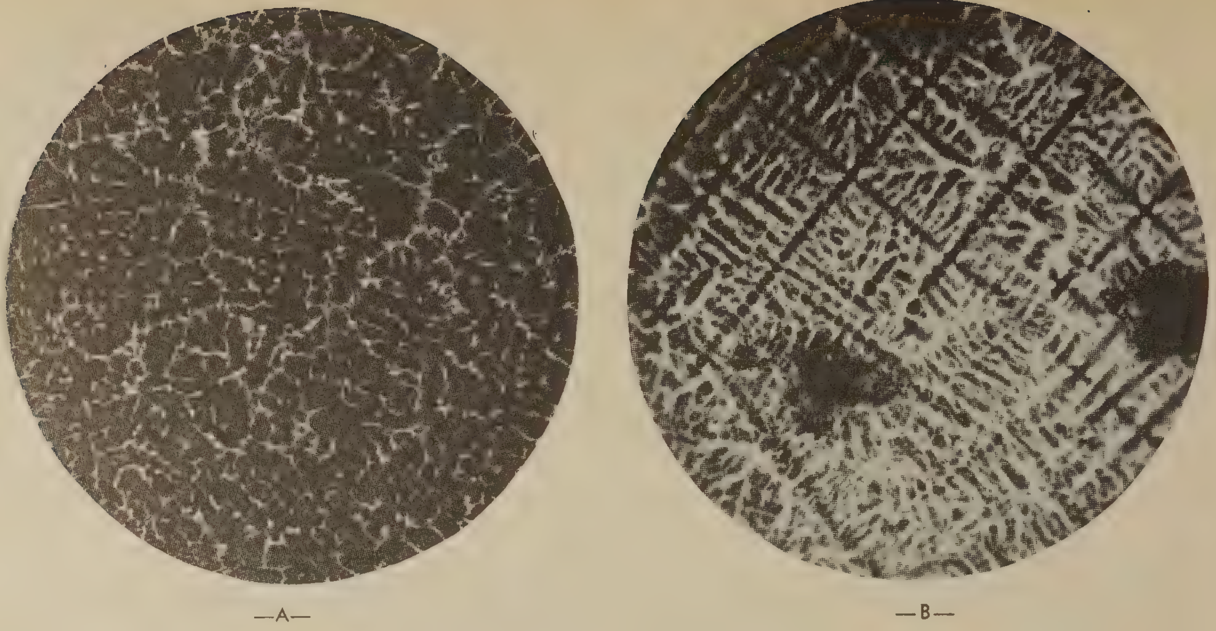


FIG. 5—A photomicrograph of a 9 pct Cu aluminum alloy is shown at *A* (40X, HF etch), compared with the same structure in the microradiograph at *B* (40X).

is the mass absorption coefficient of the homogeneous material, which increases very rapidly with increasing wave length of the X rays and with increasing atomic number of the absorbing element.

The value of microradiography lies in its ability to improve the metallurgists' two-dimensional picture of microconstituents in metals. For example, the graphite in gray cast iron has many configurations described as flake, plate, whorl, nodule, and rosette, and many kinds of distributions such as random, interdendritic, and eutectiform. The size, shape, and distribution of these graphite particles have an important influence on the engineering properties of cast iron. While ordinary metallography reveals the structure intersected by one plane, microradiography projects the entire structure on the plane of observation.

In this article photomicrographs and microradiographs of the same specimens are reproduced for comparing the appearance of certain structures in gray cast iron, malleable iron, bronze, and aluminum, as revealed by the two techniques.

Fig. 1A is a conventional photomicrograph of a gray iron specimen, unetched, at 40X, showing both hypereutectic kish graphite and normal, randomly distributed graphite imbedded in the metallic matrix. Fig. 1B is a microradiograph of the same specimen at 40X. It is immediately apparent that the quantity of graphite visible by microradiography is much greater than the amount observed by photomicrography, because the former is the projection on one plane of all the graphite in a specimen, while the latter shows only the graphite exposed on the single plane of observation. The graphite flakes in fig. 1B are broader than those in fig. 1A because the maximum graphite width is more nearly revealed in the microradiograph than in the photomicrograph. The crossing of graphite flakes in different planes can also be seen in fig. 1B.

Fig. 2A, an unetched photomicrograph of another specimen, at 50X, reveals a tendency for the graphite in the gray iron to follow a pattern identified as Type E in the AFA graphite standards. Fig. 2B, a microradiograph at 30X of this specimen, shows clearly the dendritic manner in which the metal solidified and the interdendritic pattern of the graphite distribution.

Figs. 3A and 3B present a similar comparison for malleable iron. The former is a photomicrograph at 40X and the latter (fig. 3B) is a microradiograph at the same magnification. Similar to the previous comparisons, more graphite is visible in fig. 3B than in fig. 3A.

Microradiography is also well adapted to the study of nonferrous alloys. Figs. 4A and 4B are, respectively, a photomicrograph and a microradiograph, at 40X, of Navy M bronze. In the former, the alpha solid solution of copper and tin is the clear background which forms the core of the dendrites. The interdendritic islands are the low melting point delta Cu-Sn solid solution. Interpretation of the black areas is difficult since some are shrinkage and others are voids created by pulling out the soft lead constituent during polishing. The advantage of microradiography is apparent in fig. 4B in which the microporosity is black and primarily interdendritic. The structure has a cellular appearance which is outlined by the diffuse, light gray zones representing the delta constituent. The dense low melting lead appears as sharp white spots in the light gray delta phase. The darker material within the cells is the less dense alpha solid solution.

Contrast between the microscopic and X ray appearance of still another nonferrous sample is afforded by figs. 5A and 5B—an aluminum alloy containing 9 pct Cu. The grain boundaries observed in fig. 5A contain the eutectic, $CuAl_2$—

aluminum-copper solid solution. The background is composed entirely of the aluminum-copper solid solution. Similar to the other materials examined, microradiography brings out the dendritic characteristics of the metal. The aluminum rich dendrites appear dark because they offer less resistance to X ray penetration than the eutectic, $CuAl_2$—aluminum-copper solid solution, which appears light in color. The lower melting eutectic solidified last and therefore lies between the dendrites. Several holes are also visible.

In concluding, it should be emphasized that microradiography is not a substitute for photomicrography, but an auxiliary tool to be used for fuller understanding of the mechanism and significance of the various microconstituents in metals.

Opinions expressed in this article are the private views of the writers and are not to be construed as reflecting the views of the Navy Dept. or the Naval service at large.—Ed.

Oxygen Used in 726 OH Heats

THE experience of making 726 heats in two 200-ton furnaces in Republic Steel's Cleveland district was described in a paper presented at the recent AISE annual convention at Pittsburgh. This paper, which covered heats made between Dec. 9, 1946 and Aug. 18, 1947, was delivered by E. C. McDonald of Republic. Oxygen was used through the burners and by direct injection into the bath with a submerged pipe or lance. The normal charge contained 70 to 80 pct hot metal.

On heats up to May 1, burner oxygen in the range of 30,000 to 40,000 cu ft per hour was used after the scrap was charged. After that date, burner oxygen was not used until the doors were banked in order to conserve oxygen. Fuel used was predominately oil but some coke gas was also used. The author stated the use of oxygen in the burners permitted an increase in fuel rate during meltdown, of 15 million Btu per hour to a maximum of 95 million Btu per hour.

Lancing was usually started shortly after the first flush and the starting time was governed by experience acquired experimentally. Occasionally, the lancing operation was started directly after addition of the hot metal. Normal rate for lancing was 50,000 cu ft per hour, but this has been doubled by using two lances. Burner oxygen was used as required to restore and maintain temperature as fuel was turned on between lances. Oxygen consumption ranged from 850 to 1300 cu ft per ton, divided about equally between burner use and lances. Lance life averaged about 20 min with five to six lances used per heat and total time lances were in the furnaces averaged 2 hr.

To improve refractory life, furnace design changes were made which included raising the roof opening up the ends, increasing the size of uptakes and water cooling the brick walls. However, no appreciable increase in roof life resulted from these changes. Checker openings were increased to reduce blocking from dust carried over while using lances. Although it has been proved that heat time can be reduced to 40 pct and fuel consumption decreased by 30 pct with oxygen, monthly production rates were affected by time that furnaces were down for brick work, largely roof failure caused by splash and iron oxide penetration. This constitutes the primary problem at present. Dust emission while using the lance was also a problem. Experience with 85 pct efficient waste gas scrubbers indicated that better dust collection is required. Analysis of the red to chocolate fume emitted while lancing showed it to be highly magnetic and roughly 88 pct ferric oxide.

Quality, yield and surface on the oxygen heats was said to equal regular practice. A number of other conditions upon which the continuation and extension of the use of oxygen depends were described.

Diecasting in Germany

MAGNESIUM alloys were used extensively for pressure diecasting in Germany prior to the war and their use expanded considerably during the war. Most of this work was handled by the Mahle Co. and its subsidiaries. In 1944 this concern produced 1800 tons of magnesium-alloy pressure diecastings, according to F. A. Fox, assistant director of research, British Welding Research Assn., in an article in *Metal Treatment* (London).

The success of Mahle's process was mainly attributed to the hot chamber pressure diecasting machines which they developed. A piston-type hot chamber was used for small pressure diecasting. For larger parts an air pressure machine was used which operated at 30 to 80 atmospheres. Technicians were said to have worked on the principle that oxidation of the magnesium must be kept to the minimum, and in their machines atmosphere was kept away from the metal entering the die. The author reported gating and venting of the dies were closely studied to minimize the entrapment of air entering the die. With the Mahle hot chamber, production speeds which approached two thirds the number of shots per hour made under similar conditions with a zinc alloy were reported.

In the air pressure machine, air in contact with the metal was said to contain sulfur dioxide to reduce oxidation, and toward the end of the war small additions of beryllium were also added for this purpose. It was reported this type of machine proved to be somewhat dangerous in operation since the automatic needle-type valve did not always close properly, causing molten metal to be blown out. Safety booths were employed to overcome this. Dies were reported to be water cooled and were maintained at 110° to 140°F.

Common Plating Bath Troubles —

SUCCESS in an industrial process can often be measured by the percentage of rejects. In the early stages of a procedure the reject percentage may be higher than in the final stages, for the most costly rejects are those that are produced late in the process. Electroplating is often the final step and it is therefore essential that high plating quality be maintained.

The percentage of rejects in a plating process can be kept low by close control over the bath and by frequent testing. In a large scale process or for plating of expensive parts such routine testing is economical. The control cost is small compared to the cost of the articles produced. However, close observation at the plating line is good practice, for troubles are not always predictable by control methods. Also it is better to observe the trouble at its source than by inspection after plating.

The practical plater depends greatly on observation at the plating line to keep his rejects low. He knows that specific troubles may appear over the entire piece or in high or low current density areas. If all areas are affected, the trouble may be in the cleaning or pickling step. A general spotty condition indicates poor cleaning. A blistered deposit or poor adhesion also indicates poor cleaning but may just as well be due to improper pickling or a porous or cracked base metal.

If an overall deposit is rough from a copper cyanide bath, it often means that the piece is merely overplated, for heavy, smooth deposits cannot be obtained from such a bath. On the other hand, if the piece is not overplated and is rough, then impurities, and particularly suspended impurities may be suspected. If the piece is rough in high current density areas, it means that the optimum plating range has shifted to lower current densities. This can be caused by low metal content. The condition can be temporarily corrected by lowering the total current and more permanently corrected by adding more metal.

If the plated article is rough, discolored or spotty in low current density areas, it may mean that the bath is contaminated with noble metal impurities. These may be removed by low current density electrolysis or by chemical means if the specific contaminating metal is known.

Low current density troubles are specific for some baths. For instance, poor coverage in a bright nickel bath may be due to high secondary brightener content. Chromium contamination can cause poor coverage in a high efficiency copper bath and can stop coverage in low current density areas in a bright cadmium bath.

High free cyanide can cause a rough and burnt deposit in high current density areas in cadmium, copper and silver baths.

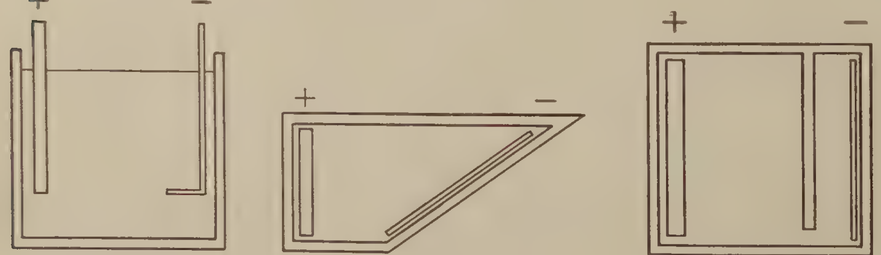
In small scale practical processes, the effects of high or low acid content, high or low cyanide content and high or low metal content are observed during plating. Corrections are made from a knowledge of the behavior of the bath. This procedure has a place in some types of plating, but is unwise where the cost of control is small.

In a controlled process chemical limits are placed on the bath and maintained by analysis. In the event of trouble a chemical analysis can then be made so that the effect of all constituents under control can be eliminated from the problem.

Plating Range Tests

A plating range test is an aid to control for small scale plating where additions are made to a bath to maintain the plating range. If a bath can be controlled over a satisfactory range of current densities, then the bath may be used regardless of the analysis. Such a procedure makes it possible to make rapid corrections to a plating bath but is not as satisfactory as control of all plating variables within limits.

In the controlled plating process the plating range test may be used to control addition agents where there are no analytical methods for such constituents. It may also be used to predict troubles due to impurities before the impurities reach an objectionable concentration. Contami-



Bent cathode cell

Hull cell

Slot cell

FIG. 1—Types of plating range test cells used to obtain a range of current densities over a cathode.

Their Causes and Cures

By J. B. MOHLER
Research Chemist

Plating process rejects occurring, as they usually do, in the final step of a manufacturing process are too expensive to be tolerated. A practical, comprehensive discussion of common plating bath troubles and corrective measures for them is given in this article. Rough, burnt, off color, peeled, brittle, cracked, blistered, spotty and pitted deposits are diagnosed and cures are suggested. Testing and control methods, both general and specific, are described, and a continuous purification system is discussed.

nation of a bath will be recognized by off color, rough, spotty or thin deposits in a part of the plating range. Also the entire plating range may shift. If these troubles appear at high or low current density on the test plate, they may not yet show on the work and may be corrected before becoming serious.

Plating range tests consist of any means of obtaining a range of current densities over a cathode by the shape or the position of the cathode in the test cell. Probably the simplest test is the bent cathode test,[1] which merely consists of bending a cathode at a right angle and suspending it from the side of a beaker opposite the anode. The most popular test consists of an inclined cathode and is known as the Hull test.[2]

A range of current densities can also be obtained in a test cell by plating through a slot. Such a cell, which may be called a slot-cell[3], has the advantage that the slot acts like an anode and eliminates anode polarization problems from the test. A slot-cell may either be suspended in the plating bath or may be used as a unit separate from the bath. Fig. 1 shows diagrams of these three types of plating range test cells.

Plating Bath Troubles

Specific plating bath troubles are often due to local conditions in the plating line. For a particular plating installation all sources of contamination should be considered. The bath can become contaminated from everything with which it comes in contact; from the air, from the water, from the chemicals, from the tanks, from the racks and from the work. Thus all metals, salts, dust, and organic materials that come in contact with the bath should be suspect. It is not possible to make a complete list of contaminants since the effects of all of these on all of the plating baths are not known. Nevertheless there are a number of troubles that are common to many of the plating baths, and it is well to have these in mind.

The following are general plating bath troubles that appear on the work:

Rough Deposit—A rough deposit is most commonly due to suspended material in the bath. This may come from dust in the air, particles from the anodes, chemical decomposition of the bath or excess of colloidal addition agents. The condition is corrected by filtering the bath. Large suspended particles are removed by ordinary filtration, but colloidal particles can only be removed by filtration through activated charcoal. In the latter case the activated charcoal may also remove the active portion of the addition agent so that an addition agent correction will be required after treatment. If suspended particles are indicated as a source of trouble, a test portion of the bath should be filtered and a plating test run before and after filtration. From the test information obtained, corrections can be made on the plating bath.

Burnt Deposit—Deposits sometimes become rough in high current density areas of the plated article. This is due to exceeding the high current density limit of the plating range. It is corrected by any means of lowering the current in these areas; that is, by lowering the total current, by shadowing, or by robbing current from the affected areas. If such trouble appears where it was not previously experienced, it means that the plating range has shifted to lower current densities. A plating range test will confirm this and permanent correction can be made by adjustment or purification of the bath. An improper amount of addition agent often causes such trouble. In cyanide baths excessive carbonate may cause burning. This is avoided by keeping a log on the bath and determining the maximum allowable carbonate content. When this amount of carbonate is exceeded, a portion of the bath must be dumped or the carbonate must be precipitated chemically or crystallized by cooling the bath.

---

[1] *W. L. Guthrie and F. L. Clifton, The Monthly Review* 34, 140 (1947).

[2] *R. O. Hull, Conv. Proc. Amer. Electroplaters Soc.,* 1939, *p.* 52.

[3] *See "Rapid Plating Range Test,"* THE IRON AGE, *Dec.* 4, 1947, *p.* 75.

Off Color Deposit—The deposit may become off color for a variety of reasons. In the brass bath this may happen due to accumulation of ammonia in the bath from chemical decomposition of the cyanide. It is corrected by boiling out the ammonia. An off color deposit may indicate the need for addition agent in a bright nickel bath. In general it means that impurities have entered the bath and purification tests should be made. Purification tests consist of low current density electrolysis and treatment with activated carbon.

If the deposit is off color in low current density areas, noble metal contamination is indicated. If such is the case the noble metals will deposit more readily at low current density. Low current density purification is generally carried out at 2 to 5-amp per sq ft. A test may be made in a small test cell with a large cathode area. Small portions under such conditions may be purified in 2 to 20 min, and from the data obtained the number of ampere hours required to purify a large bath may be determined.

Peeled Deposit—A deposit will sometimes peel from the base metal during plating. This is due to stress in the deposit and is generally associated with the baths that are used for hard deposits such as chromium and hard nickel. In some cases peeling indicates poor adhesion and is associated with the troubles that lead to poor adhesion. In other cases it merely means that the plating range has been exceeded since some deposits are so highly stressed that they will peel even though bond was obtained between the deposit and the base metal on initial plating. Organic impurities in many baths, particularly the acid baths, can cause stress in plating. These organic materials may come from tank linings, rack coatings or stop-off lacquers. An excess of organic addition agent can cause the same trouble. In fact depositions from bright nickel baths may peel in layers from this cause.

Cracked Deposit—Cracks will sometimes appear in a deposit for the same reasons that cause peeling. However, if cracks develop, the base metal should be inspected since cracks in the base metal are not likely to be bridged by the coating.

Brittle Deposit—The causes that lead to cracked and peeled deposits also cause the deposit to be brittle.[4] If the part is to be formed after plating, it may crack during the forming operation. However, brittleness can be caused as well by excessive exposure of the base metal to active hydrogen either in the pickling step or in the plating process. Chromium deposits become embrittled during plating due to the low cathode efficiency of the bath with subsequent high hydrogen evolution. If the chromium is to be ground after plating, it is common practice to anneal the piece. When embrittlement is suspected to be due to hydrogen exposure in the pickling step, electrolytic methods can be tried in place of chemical pickling.

Blistered Deposit—Just as a cracked base metal will show after plating, so will a porous base metal. Cracks and porosity can be detected microscopically, or the condition can be detected by porosity or blacklight tests.[5] There is no way of salvaging such material. If cracks and porosity are objectionable, a standard must be specified as a basis for rejection prior to plating. Porosity sometimes shows up as a blistered deposit. If the pores are bridged over during plating, blisters may subsequently develop, particularly if the piece is ever heated. Blisters indicate faults in the base metal but may also be due to poor adhesion. In such a case the adhesion is spotty and is probably due to insufficient cleaning or pickling.

Pitted Deposit—If the base metal is porous and the deposit will not bridge the pores, the deposit will be pitted. The deposit itself can become pitted due to contamination. Nickel baths are notable for this tendency. In an ordinary Watts nickel bath, pitting is controlled by addition of hydrogen peroxide and can be avoided by routine daily additions.

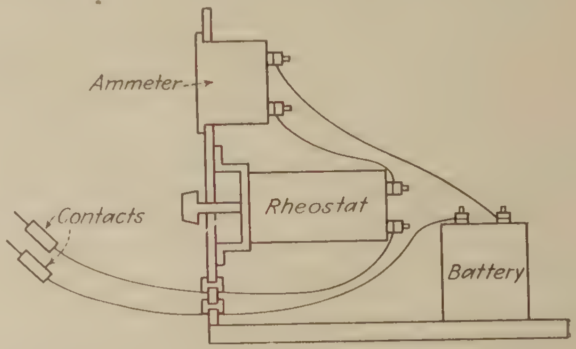


FIG. 2—Portable testing unit for measuring uniformity and positiveness of plating bath electrical contacts.

Spotty Deposit—The deposit may develop spots. These can be due to pores in the base metal that trap solution. On standing the deposit develops spots due to the trapped solution slowly leaking out of the pores.

Spots may also be seen on work taken directly from the bath. This is usually an indication of contamination that is not great enough to discolor the whole cathode area. Purification tests will indicate whether the contaminant can be removed from the bath.

Poor Adhesion—Poor adhesion is not always an easy thing to detect. If the deposit is thin, it may appear to adhere even though adhesion is very poor. This trouble is one that is often found months after the piece has been plated or after it is placed in service. For this reason it is best to make routine checks for adhesion. The adhesion test will depend on the shape and strength of the piece, and the type and thickness of the deposit. Thick, hard deposits are the easiest to test, but care must be taken that the test is not merely a measure of brittleness rather than adhesion. The American Electroplaters' Society recently investigated adhesion tests[6] and reported tests based on burnishing, bending, twisting, pounding, chiseling, scratching and shot blasting. Nondestructive tests have not been successful, so it is necessary to develop a standard routine destructive test that is adaptable to the piece and the metal applied.

---

[4] *"Reducing Embrittlement in Electroplating," by C. T. Eakin and H. W. Lownie, Jr.,* THE IRON AGE, *Nov.* 21, 1946, *p.* 69.

[5] *U. S. Patents* 2,259,400; 2,405,078.

If adhesion is found to be poor, it is generally due to poor cleaning or insufficient pickling. Cleaning and pickling tests may be run in the laboratory to determine if standard cleaning and pickling procedures will produce satisfactory adhesion. If not, then the base metal may be contaminated with oil or grease that resists ordinary pickling and cleaning practice. This may go back to the oil used in the rolling mill. Certain oils become rolled into the steel to some extent and others undergo chemical changes due to the heat and pressure of rolling. These oils that are chemically changed may cause trouble with adhesion. Even though the piece appears to be cleaned and is etched by the acid, adhesion may be poor. If such cause is suspected, it is best to clean, etch and then clean and etch again. The second cleaning and etching apparently removes a small amount of oil or grease that cannot be detected but still leads to poor adhesion.

In some plating processes cleaning and etching is not enough to obtain bond. A strike step often has to be inserted. This consists of plating from a low efficiency silver or copper cyanide bath after pickling and before plating. It is an essential step for silver plating on steel and for other plating processes and is a good step for experimentation where poor adhesion is experienced.

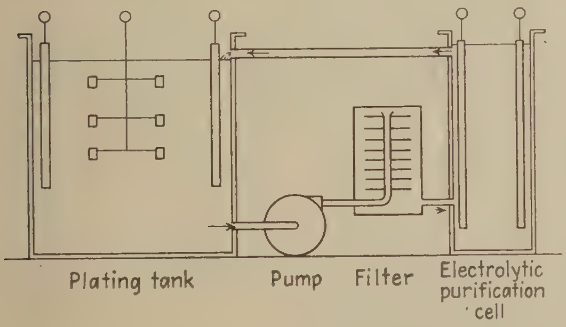


FIG. 3—Continuous purification system for maintaining plating baths without shutdown.

There are many ramifications to the details of cleaning and pickling. If troubles are suspected in the preparatory steps, the experience of others or the literature will have to be consulted.

Underplated or Overplated Deposits—Deposits may be too thin or too heavy in areas on a plated piece. When this occurs, corrections must be made according to the principles of shadowing, robbing, or anode design to obtain more uniform deposits.[7]

If one or two racks plate thin or heavy compared to others, the position of the racks in the tank or the contacts are the source of trouble. The position of the racks in the tank should be such that all racks have an equal chance to receive current and such that one rack does not shadow the current or rob the current from another rack. If the position of the racks and the position of the pieces on the racks are proper, attention can be turned to contacts. Contacts should be kept clean and the weight of a piece on the rack should be heavy enough to make positive contact. If this is not the case, springs or clamps may be used to increase the contact pressure.

Pieces on a rack or a number of racks in a tank can be tested for uniformity of contact pressure. A portable testing instrument (see fig. 2) is easily constructed from a rheostat, an ammeter and a battery. A 1½-v battery and a 10-milliampere meter are convenient for this purpose. For this voltage and amperage a 1000 to 40,000-ohm carbon compression rheostat is convenient. In using the instrument the leads are shorted and the current adjusted to any convenient value. The leads are then touched on either side of the contact to be tested. A low reading indicates a poor contact and experimentation with the racks will reveal how uniform positive contacts can be obtained.

Procedure for Treating a Bath

In the event of trouble, procedures usually follow a similar pattern of steps for correction. First the trouble itself suggests the procedure for correction. If the deposit is blistered, spotty, burnt, etc., corrective steps follow those previously indicated. If the cause of the trouble is not apparent, then the electrical system and the bath itself may both be suspected.

In the first instance the tank should be examined for poor contacts and stray currents. Contacts can be checked by the ammeter method and the tank voltage and amperage should be checked to determine if it is normal for the amount of work in the tank. If the tank is steel, it should be examined for plating on the tank or gassing of the tank as an indication of stray current. Also it is well to run a rake across the bottom of the tank to determine if metal has fallen into the bath. Metal in the bath can contaminate the bath and can cause electric shorts. If the tank is plastic or brick lined, it should be examined for breaks in the lining that may be points for current to pass to the tank or for chemical attack of the tank. It is also worthwhile to test the electric meters with a master meter.

If the plating bath is suspected, the first step is to submit a sample for chemical analysis. In the meantime plating tests should be made, but the analysis is important since testing is best done on a bath that is within chemical limits. When the bath is within proved limits, troubles are more easily laid to a cause that eludes chemical analysis.

If rapid overall checks are of value, a log on the plating bath is very convenient. Then it will be known how the bath previously varied chem-

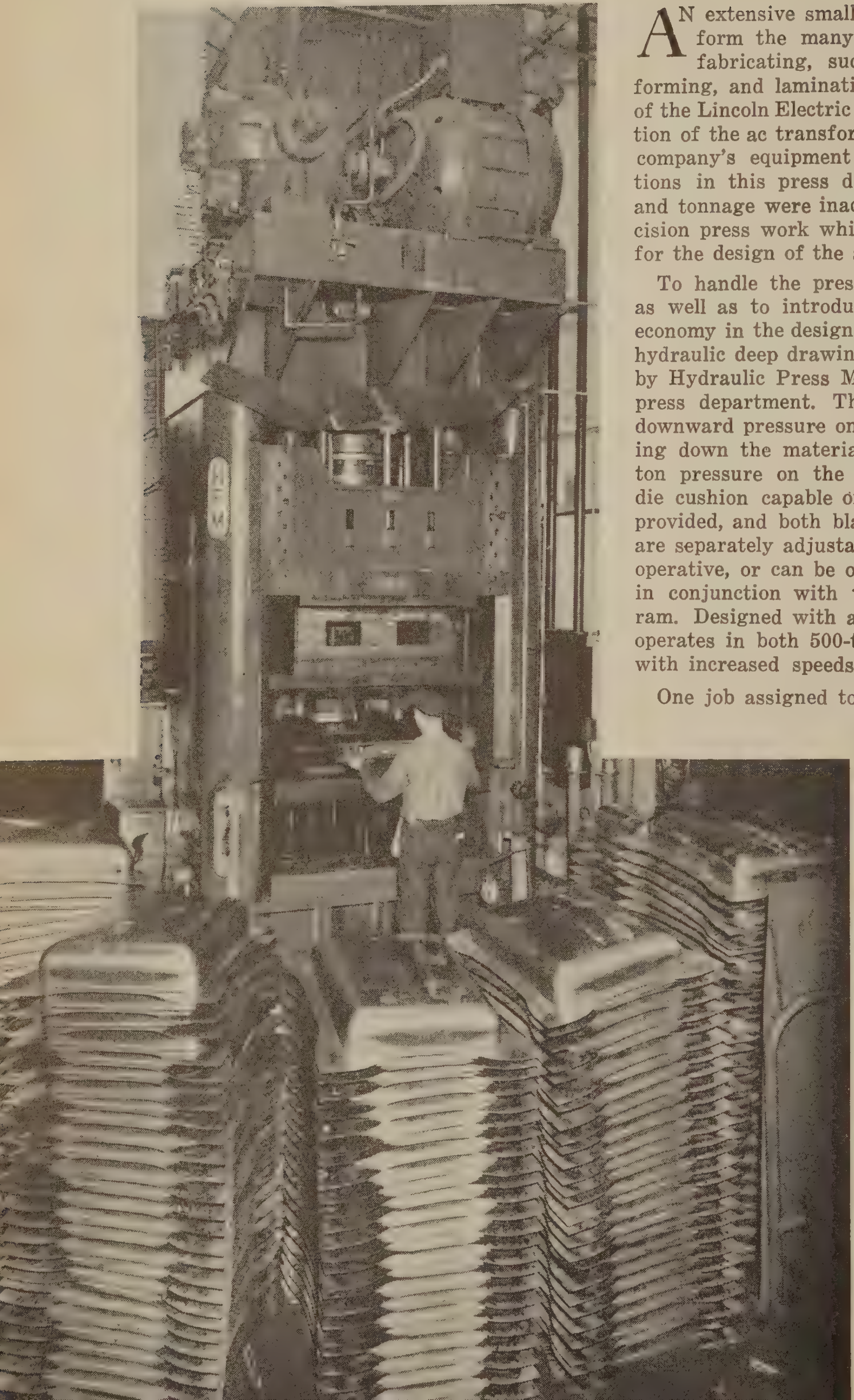
(*Continued on page* 170)

---

[6] *A. L. Ferguson, The Monthly Review,* 33, 1285 (1946).

[7] *N. A. Tope, Journal Electrodepositors' Tech. Soc.,* 22, 29 (1947).

Stampings for Welded Fabrication



AN extensive small press department to perform the many basic operations of steel fabricating, such as blanking, piercing, forming, and lamination punching, is a feature of the Lincoln Electric Co. plant. The recent addition of the ac transformer type of welder to the company's equipment revealed certain limitations in this press department. Both capacity and tonnage were inadequate to handle the precision press work which was the starting point for the design of the ac machine.

To handle the press work for the ac welder as well as to introduce further flexibility and economy in the design of dc machines, a 500-ton hydraulic deep drawing and forming press, built by Hydraulic Press Mfg. Co., was added to the press department. The press exerts a 500-ton downward pressure on the main ram while holding down the material being formed with 150-ton pressure on the blankholder. A hydraulic die cushion capable of 100-ton pressure is also provided, and both blankholder and die cushion are separately adjustable. Both can be made inoperative, or can be operated singly or together in conjunction with the main punch carrying ram. Designed with a compound ram, the press operates in both 500-ton and 200-ton pressures, with increased speeds for the lighter pressure.

One job assigned to the press is the forming

FIG. 1—These cover sections for the Lincoln ac welder cabinets, after forming are shown being fed back through the 500-ton press for trimming and delivery to assembly.

Cut Costs and Increase Production

The addition of a 500-ton hydraulic press to its mechanical press department has enabled Lincoln Electric Co., Cleveland, to eliminate certain machining operations, casting and forging purchases and subcontracting. The use of this press to perform a variety of operations is described.

o o o

By CHARLES G. HERBRUCK
Lincoln Electric Co.,
Cleveland

o o o

of the cabinet for the new ac transformer type welder. This housing is of 18-gage deep-drawing steel in three sections—top, back, and front. The top, or cover section of the cabinet, is rectangular and drawn to a depth of 5 in. One operation is required to produce the finished form, fig. 1, followed by a press trim with a Brehm-type die. Cycle time for the draw is 19 sec; 200 tons pressure is used, with blankholder pressure set at 60 tons and die cushion at 12 tons.

The successful operation of this forming die suggested to the design engineers the opportunity for savings on an entirely different item.

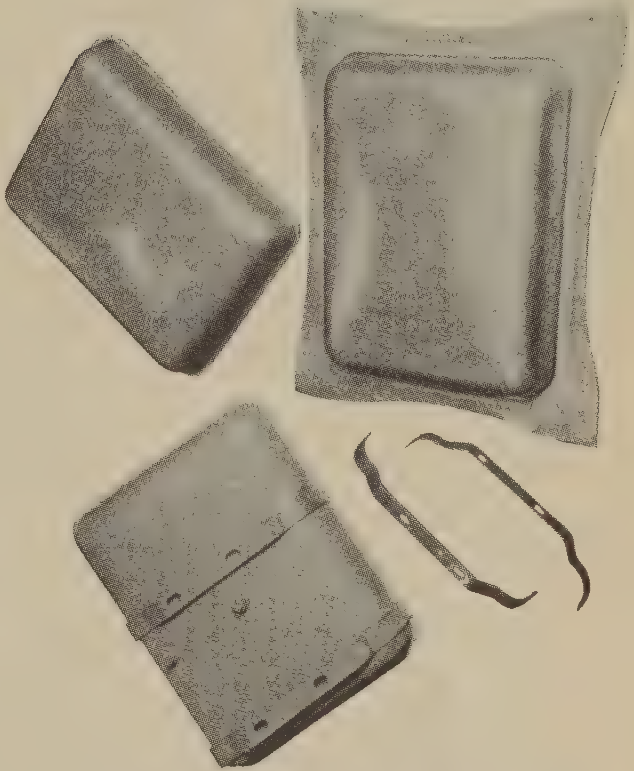


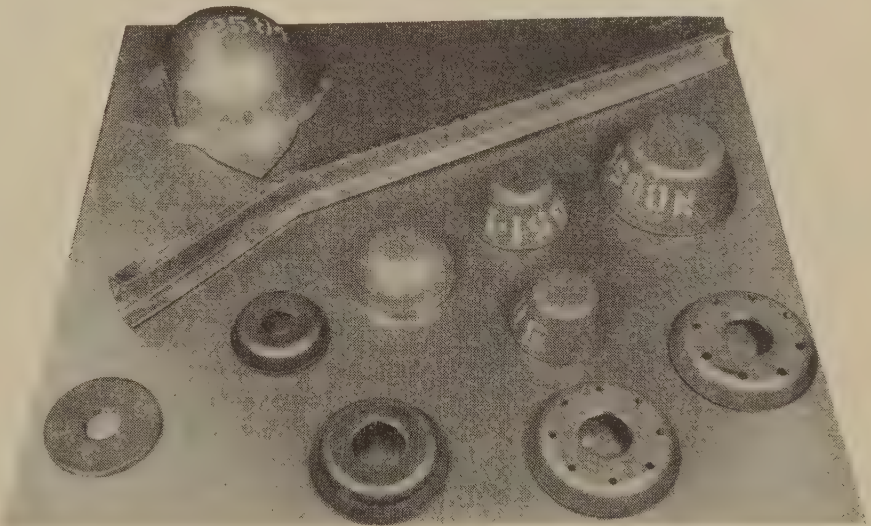
FIG. 2—Press produced parts, two covers and two feet, are welded together to form gasoline tanks. The same dies as are used for the welder cabinet sections are used in forming the tank sections.

Using this same deep drawing die, terneplate could be formed to make parts that could be fabricated into a low-cost gasoline tank for engine powered welders. The components are shown

o o o

FIG. 3—The pressed commutator end bell cover (upper left) has taken the place of a casting. The truck handle (center) is formed in a single press operation, being formerly purchased. Friction cones (right center) were formerly machined but are now produced to close tolerances on a press. The drawn and pierced commutator caps (right) replaced forged parts.

o o o



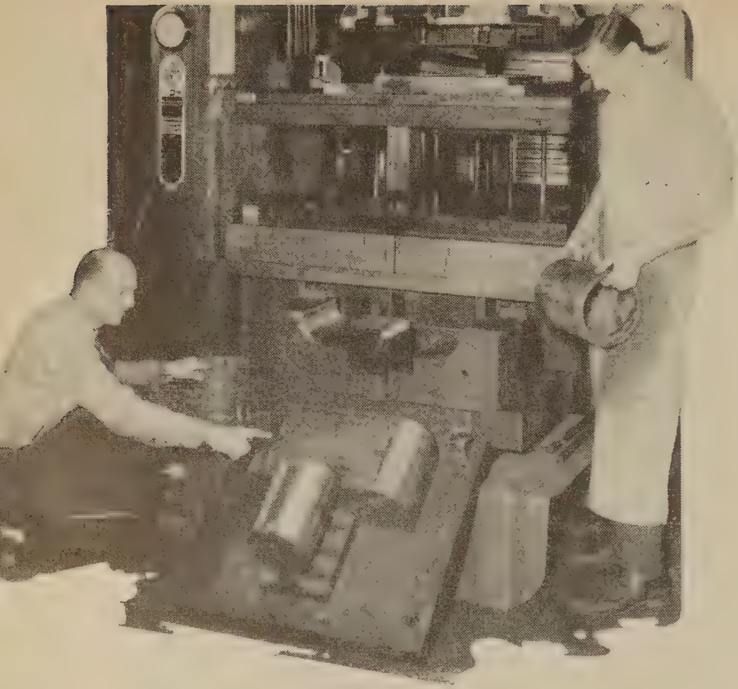


FIG. 4—The laminated die sections used in producing heavy gage exciter frame rings are shown here, along with the formed ring.

○ ○ ○

in fig. 2. Accordingly, pieces of terneplate are now drawn to the same shape as the ac cabinet covers; are then punched; and the fittings are soldered in. The two pieces, each forming one half of the tank, are clamped tightly together in a specially designed jig and welded together manually. Utility feet, blanked out of 5/32-in. plate five at a time, are then welded to the finished tank. This tank now replaces at considerable saving a fabricated unit formerly bought outside.

Significant Savings Evident

Significant savings are evident in an entirely different type of press production—the forming of commutator caps for various sizes of welding machines, shown in fig. 3. The forming is a single-action press operation, with the ram working at full pressure to produce these parts at the rate of 180 per hr. For such single-action work, the blankholder press slide is bolted fast to the main punch-carrying slide. The die cushion in the press bed is made inoperative by a shut-off valve adjustment. Dies required for forming commutator caps are comparatively simple, and the total unit cost is 33 pct of the cost of the forgings these parts replace.

An example of precision presswork is the fabrication of mating cone sections which, used with a friction liner, brake the air gap setting which controls the output of the ac welding generators. Up to 6000 in.-lb torque must be controlled by these parts to hold the welding conditions desired by the operator, hence a consistently high quality of fit is required. Formerly machined, the parts shown in fig. 3, are now completely produced by presswork. From circular blanks of ¼-in. stock, the parts are cupped, drawn to truncated cone form, pierced for a shaft, annealed, then restruck for final sizing. The resultant surface produced by the press is comparable to a ground finish; male cone sections are easily held to 0.0001 in. in concentricity, and within 0.0015 in. flat on the outer surface.

Save Time and Money

Advantages accrued from several directions when commutator end bell covers, shown in fig. 3, were designed for drawing from 18-gage plate. Formerly castings, these parts are now produced in three operations, drawn and trim, followed by piercing on a smaller press, and are available in quantity on quick notice. Cost has also been reduced, while machining has been eliminated. Finally, the weight saving involved is emphasized as weight is appraised at 1¢ a lb, in average handling and shipping charges.

The flexibility of welded steel fabricating is further demonstrated in the rough and heavy forming jobs in the press that are the basic operations for welded assemblies. The principal component of the truck handle, fig. 3, for portable welders was formerly procured outside, being fabricated of a rolled channel and in a second operation bent to provide clearance for the truck body. This part is now press-formed in a simple operation from flat sheet, at a substantial saving.

One stroke of the press likewise performs the first two operations of the three necessary to form heavy strips of 11/16-in. plate into circular rings, which, when welded, become exciter generator frames. This operation is performed at 500 tons pressure with a two-operation die. The first station in the die bends the ends of the 10 x 24-in. strip of 11/16-in. stock, while the second station of the die closes the strip into a circular form. The third operation, performed in another die, completes the final form.

The construction of the two station die presents an unusual approach to diemaking for this type of work. The male and female die elements for the bending operation were built up in a laminated assembly of pieces of 1-in. carbon steel plate, flame cut to the desired contour line, and welded together, as shown in fig. 4.

Long Wear Cited

The wearing edges of the die were then hard surfaced by depositing weld metal of tool steel quality with Lincoln Abrasoweld. This die has formed over 20,000 pieces out of rough scaly stock with little or no wear on the forming surfaces. It is estimated that dies made in this manner will stand up twice as long as dies conventionally made completely with tool steel. The total cost of dies made in this fashion represents about 40 pct of usual die cost, while time required for production is greatly reduced. Such laminated dies will be found most advantageous for rough bending and forming, particularly when there is an unusual contour involved.

Electric Furnace Steelmen Study Quality Problems

. . . Fifth Annual AIME Electric Furnace Steel Conference . . . More than 600 in attendance . . . Factors affecting steel quality studied in detail.

° ° °

STEEL cleanliness, deoxidation, production of sound ingots, use of oxygen, and slag volume control, subjects close to the heart of the electric furnace steelmaker, held a prominent position on the agenda of the fifth annual conference of the Electric Furnace Steel Committee, Iron and Steel Div., AIME, held in Pittsburgh, recently.

Under the able direction of W. J. Reagan, associate professor of metallurgy, Pennsylvania State College, Pa., chairman of the Electric Furnace Steel Executive Committee; J. B. Caine, metallurgist, Sawbrook Steel Castings Co., Lockland, Ohio, chairman of the committee for the fifth conference; and N. I. Stotz, president, Braeburn Alloy Steel Corp., Braeburn, Pa., vice-chairman; the some 600 registrants were treated to an informative and stimulating conference.

Announcement was made that the next conference is to be held in Pittsburgh, Dec. 2, 3 and 4, 1948, under the direction of J. B. Caine, chairman, Electric Furnace Steel Executive Committee; N. I. Stotz, chairman, Committee for the Sixth Conference and J. A. Bowers, melting superintendent, American Cast Iron Pipe Co., Birmingham, vice-chairman.

Several of the interesting papers are reviewed briefly herein; other papers will be discussed in subsequent issues of THE IRON AGE.

One of the timely presentations, entitled "Present Applications of Oxygen in Electric Furnace Steelmaking," was delivered by J. H. Berryman, Air Reduction Sales Co., New York. The author pointed out that the present uses of oxygen in electric furnace steelmaking fall into three fields; (1) as an aid to scrap melting, (2) as a means of controlling bath temperature, and (3) to accelerate decarburization.

Some interesting observations can be made from results obtained in various shops using oxygen as a bath reagent, as follows:

(1) High charges of chrome scrap can be used on alloy heats which predicate savings in chrome recovery.

(2) Removal of carbon is so rapid that chromic oxide in the slag is at a minimum compared to former practice of scale and ore additions to remove carbon.

(3) Furnace walls and roof are in better condition due to the smaller amounts of ferrochrome necessary to add to the heats.

(4) Carbons in the ranges of 0.025 to 0.05 pct would not be obtainable using high chrome scrap charges if oxygen were not used.

(5) Average power savings on oxygen treated heats are in the order of 20 pct.

(6) Furnace refractories, in general, are in better condition due to shorter periods of being held at high temperatures.

(7) Furnace shutdowns due to peak plant load demands are less critical since oxygen can be used to hold bath temperatures at later stages in the heat.

(8) The effect of using oxygen as a reagent on the furnace bottom in low carbon steels has been at least no worse than with normal ore practice, and the shortened period of refining actually increases the refractory life of the furnace lining.

(9) In heats having a high carbon melt a combination ore and oxygen reaction has been used

with some success. However, the practical limit of the rate of carbon oxidation in the electric furnace as now designed is after all dependent upon the ability of the furnace to pass off the volume of gases formed from the reaction.

He pointed to future possibilities of more fully utilizing the advantages offered by the use of oxygen. (1) A stack type roof has been thought of which would carry off the gases generated and permit greater volumes of oxygen to be used with resultant reduced heat times. (2) An oxygen-oil burner to be used in conjunction with the stack type roof would be a fast way to melt the scrap after a molten pool is obtained using the electrodes. (3) A combination of ore and oxygen for carbon removal to control bath temperature is being tested. A hopper containing crushed ore is used through which oxygen is passed and this combination of oxidizing agents is introduced below the slag metal interface.

In his paper, "The Effect of Mold Thickness and Cooling on Base Quality of Intermediate Size Ingots," George Breyer, chief metallurgist, Crucible Steel Co. of America, Pittsburgh Crucible Div., indicated that an intensive investigation of steelmaking practice established the fact that best results can be achieved only by close adherence to the optimum pouring temperature for any grade of steel.

A study made on an alloy steel for seamless tubes showed that the amount of inclusions increased from nil at the optimum temperature (2850°F) to 6 pct on heats poured between 2780° and 2810°F. Pouring at temperatures in excess of the optimum resulted in a slight increase in inclusion content. About 60 pct of all defects were produced at bottom ingot locations.

Increased mold wall thickness showed no improved effect on general ingot quality or quality along the axial ingot zone, nor did it show reduction of the apex of the cone of solidification. Maximum segregation of nonmetallic inclusions was found in the bottom cone of solidification.

In order to determine what affect accelerating the rate of base cooling might have on the frequency and distribution of nonmetallics in the cone of solidification, a special type mold was employed, in which the bottom was so designed as to permit air circulation at the base. No noticeable improvement in ingot quality at the axial zone and apex of the cone of solidification was achieved.

In another presentation, "Review of the Effects of Refractories on Steel Cleanliness," Joseph G. Mravec, melt shop metallurgist, Timken Roller Bearing Co., Steel & Tube Div., Canton, discussed steel cleanliness as it is affected by various refractories used in the melting furnaces, the ladles, and the ingot molds. He found that refractory inclusions are most frequently encountered in the bottom portions of the ingot where freezing is the fastest, although they can be found in other positions as well.

Macro-etching of slices from the extreme ends of blooms, billets or bars shows most refractory inclusions to be about the size of a pinhead or smaller. Occasionally, particularly on cold heats, some inclusions may be considerably larger. Many of these larger inclusions have been mechanically extracted from the steel and examined under a petrographic microscope. All results of such examinations indicated that the inclusions were of fireclay origin.

W. J. REAGAN, Associate Professor of Metallurgy, Pennsylvania State College, chairman, Electric Furnace Steel Executive Committee.

The ladle lining with its very large surface area in contact with the molten steel is considered to be one of the most potential sources of refractory inclusions. On some fireclay brick linings as much as 100 cu in. of brick are eroded per ton of steel.

The author reported that to date, more than 25 different types of refractory materials for ladle linings have been tested, as well as special high refractory bricks as magnesite, periclase, chrome, forsterite, sillimanite, zircon, clay-graphite, mullite, high alumina bricks and various other alumina-silicate types. It was found that none of the high refractory type bricks produced cleaner steel than do the conventional general purpose fireclay brick. Only sillimanite and zircon bricks gave longer ladle life than normally experienced with the conventional second quality fireclay brick laid with high temperature cement, although no noticeable improvement in steel cleanliness was obtained. The use of clay graphite brick in the ladle did not noticeably affect either the cleanliness or carbon content of heats of 0.20 to 1.00 pct C.

Erroded nozzle material is also considered to be a very potential source of inclusions and during the past 16 years approximately 35 different brands and types of general purpose and special nozzles have been tested. The general purpose nozzles varied in refractoriness from PCE 16 to 29 and in porosity from 10 to 20 pct. The higher refractory special nozzles varied from PCE 31 to 37 and from 10 to 20 pct in porosity. Special nozzles were such as: magnesite, clay with magnesite insert, clay-graphite, pure graphite, zircon, carburized clay, tarred clay, and various high alumina types.

Clay mold plugs were also found to be a very potential source of fireclay inclusions, since this type plug spalls when the molten steel stream strikes it. Metal capped plugs were not found to be much better than all-clay plugs, since on older molds with thin bottoms a considerable amount of the clay sides were exposed to the steel as a result of the protruding condition of the plugs. In recent years iron plugs have been difficult to obtain, but carbon plugs have been found to be a satisfactory substitute for them.[1]

Experiments indicated that control of pouring temperature is the greatest single factor affecting steel cleanliness. Cold heats tend to be especially dirty regardless of the use of the best refractories and pouring pit practices.

Sam F. Carter, assistant melting superintendent, American Cast Iron Pipe Co., Birmingham, presented a paper entitled "Effect of Some Melting Variables on the Tensile Properties of Acid Electric Steel," wherein he described an investigation, the purpose of which was to divide acid furnace practice into its component operations, to vary one phase at a time through sufficient experimentation and to finally determine the conditions within his plant for the optimum effectiveness of each operation. The data was accumulated on all heats of one type of steel averaging 0.25 C, 0.65 Mn and 0.45 Si.

By classifying a number of heats according to one variable and obtaining fair uniformity of other variables, it has been proved that ductility is affected by certain variations in furnace practice. Statistical analyses have indicated a fair degree of significance for most of the results. From the test results obtained, it is apparent that the acid electric furnace is capable of producing steels with a high combination of tensile properties and that usual commercial specifications for cast steel can and are being met by a number of acid steelmaking practices.

It should be emphasized that the general principles considered should be common to all steelmaking methods but the quantitative details refer only to acid-electric arc melting of aluminum-killed 0.25 pct C steel for castings under the conditions within the shop. However, a harder steel should prove more sensitive to the factors studied than this mild steel, in which stresses can be more easily redistributed around inclusions and brittle constituents.

From the results of this experiment, the following conclusions have been evolved as to factors productive of steel with the best tensile properties in the author's plant.

1. The meltdown should be kept at least slightly oxidizing to minimize the possibility of gas absorption and maintain efficient arcing.
2. As soon as melted, a high concentration of iron oxide should be produced to lower residual silicon and manganese, impart maximum fluidity to inclusions, and reduce the solubility for hydrogen.
3. A meltdown should be established high enough in carbon to permit a considerable carbon drop and cause evolution of carbon monoxide gas over a sufficient period of time to flush out rejected inclusions, hydrogen, and nitrogen without carrying the slag to a low FeO content. The boiling period should be extended as long as practical in order to prevent reabsorption of atmospheric hydrogen and nitrogen by the path.
4. If previous conditions have been met, no physical advantage seems to be gained by forcing the carbon extremely low. Equal or better quality resulted when the carbon went no lower than 0.20 pct.
5. The slag should be kept moderately oxidizing and the heat slightly boiling as long as practical, while the carbon is being adjusted and the slag is being shaped up. Slightly poorer tensile properties result if slag FeO gets too low or if the heat is deoxidized too early.
6. For the first deoxidant, simultaneous manganese and silicon proved better than either element alone.
7. If for practical reasons a silicon block is advisable, it can be used with a negligible sacrifice of tensile quality if the minimum addition is made under a moderately oxidizing slag and as late as practical.
8. The manganese and silicon should be added in time to complete their deoxidation reactions before aluminum is introduced, in order to minimize the quantity of aluminum oxide inclusions. This disadvantage is encountered with ladle additions of silicon and manganese.
9. Heats that finish with slags of intermediate fluidity and FeO content average higher in ductility and tensile quality. Both oxidizing and reducing slag extremes proved detrimental to ductility.

---

[1] *"Carbon Mold Plugs in Alloy Steel Production,"* THE IRON AGE, *Nov. 27, 1947, p. 70.*

Machine Allows Standardized Buffing of Plating Panels

STANDARDIZED buffing of panels to be plated and used in atmosphere exposure tests was attained by the development and use of an automatic buffing machine, according to a paper presented at the recent convention of the American Electroplaters' Society.

In the preparation of the panels it is frequently necessary to buff the copper prior to nickel plating on the nickel prior to chrome plating. Recently in the preparation of plated panels for the SAE 1085 steel testing program of the ASTM, specified thicknesses of both copper and nickel after buffing were required. These specifications made it necessary for the platers to know the loss of metal in buffing in order to produce coatings of the desired thickness and uniformity.

Research showed that hand buffing results were quite variable over the panel, and ultimately an automatic machine for buffing the flat 4x6-in. panels was developed. The machine gave results of greater uniformity and, according to the report, is expected to prove of value in the future in comparing the buffability of plated coatings.

The amount of metal removed by buffing was determined for both copper and nickel on steel as the base metal, as well as for nickel on both buffed and unbuffed copper. At least 133 pct more copper than nickel is removed by a single buffing cycle regardless of the type or condition of base metal involved. As would be expected, less nickel is removable from a nickel plating applied to a buffed copper base than to either steel or unbuffed copper bases.

Loading the buffing wheel heavily with polishing compounds increased the amount of metal removed as much as 22.5 pct for copper and 9 pct for nickel. However uniformity over the panel was unaffected.

A comparison of the losses obtained with the machine to those obtained by typical hand operations reveals that hand buffing removes about 25 pct more copper than the machine does. And, the average deviation from the mean for hand work was ±87 mg while for the machine it was ±28 mg over the same number of operations.

For the 24 sq in. surface involved in these panels, a buffing loss of 350 mg of copper or nickel was found to correspond to the removal of 0.1 mil of metal surface.

German Wartime Technical Developments

REPORTS of German practice in various technical fields of interest to engineers and executives in the metalworking field, issued by the Office of Technical Services, Washington, are briefly described below. Copies of the reports listed below may be obtained in either photostat or microfilm form, as indicated. Orders for copies of these reports should be addressed to Office of Technical Services, Department of Commerce, Washington 25, D. C., giving the "PB" identification number. See THE IRON AGE, June 27, p. 67, Aug. 29, p. 39, Sept. 26, p. 80, Oct. 10, p. 67, Nov. 14, 1946, p. 81, Jan. 9, 1947, p. 64, Jan 16, p. 53, Mar. 6, p. 70, Apr. 17, p. 57, July 3, p. 66, July 31, p. 62, Oct. 9, p. 77, and Nov. 13, p. 98 for a list of earlier reports.

Zinc Processing—Information on equipment and methods used in rolling, extruding, alloying, die casting and drawing of zinc is given in this report based on investigations of 72 plants in the British and American occupation zones. The use of zinc as a coating, with descriptions of hot dip, electrogalvanizing and spraying methods, is also covered. *PB-75873; photostat $17.00; microfilm $6.00; 253 p.*

Emulsifying Agents — Qualities, properties, and uses of German developed emulsifiers are dealt with, and, in addition, several of the chemical formulas and production processes are given in this report. Two synthetic emulsifiers manufactured by I. G. Farbenindustrie were especially valuable in producing cutting oils and as drawing compounds for metals, according to the report. *PB-3867; photostat $4.00; microfilm 50¢; 47 p.*

Aluminum-Silicon Alloys — Electro-thermic production of aluminum-silicon alloys at the Lurgi-Thermie plant, Herrem, Germany, is described. Briquettes of powdered alumina, crushed kaolin, oil, coal, and charcoal are smelted with silica to produce an aluminum-silicon alloy containing 40 to 60 pct Si, which is then refined in an electric arc furnace and finally alloyed with aluminum metal in a gas fired melting furnace to produce an alloy containing 12 pct Si. A sketch of the reduction furnace is included. *PB-63688; photostat $1.00; microfilm $1.00; 7 p.*

Chromizing Process — German developments in diffusing chromium from a volatile chromium compound into steel are described and the process itself, known before the war, is reviewed. Aside from some experimental work, the investigators did not find any new diffusing processes in Germany. Some novel furnaces were observed, however, and are reported upon. *PB-52873; mimeographed 75¢; 22 p.*

Temperature Compensating Steel — Information on the composition, manufacture, and thermal and magnetic properties of Thermoperm, a complex type nickel steel used for its temperature compensating properties in the construction of magnetic tachometers, is given. Descriptions and photographs of German magnetic tachometers are included in the report. *PB-79574; photostat $2.00; microfilm $1.00; 25 p.*

Precision Casting Technique — A method, called the "C" Process, for making sand molds and cores for precision casting of various metals is described in this report. The process uses a molding material consisting of a dry mixture of high grade silica sand and powdered plastic binder, and was principally applied to the casting of small steel pipe fittings. Casting sizes ranged from finger rings to 8 lb fittings with cast threads. *PB-81284; mimeographed 25¢; 7 p.*

All Bronze Wire—Warp wire and shute wire of all bronze composition have been used during and since the war, according to this report. Seams are welded rather than silver soldered. The warp wire composition is 93 pct Cu and 7 pct Sn and P; the shute wire, 97 pct Cu and 3 pct Sn. According to the investigator, the all bronze wire shows better corrosion resistance than bronze-brass wire. *PB-80390; mimeographed 25¢; 9 p.*

Oxygen Use — Report states that the use of oxygen in the German iron and steel industry was largely in blast furnace production. Pig iron and ferrochromium are produced from low grade raw materials with the aid of an oxygen enriched blast. Some data on the use of oxygen in basic converters are included although, according to the investigator, this application was not emphasized. *PB-81385; mimeographed 75¢; 26 p.*

New Equipment . . .

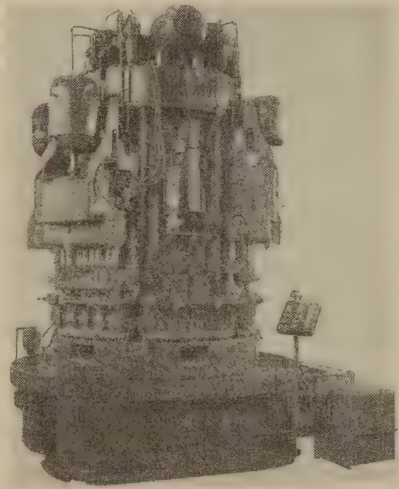
An improved line of cylindrical grinding machines, a special purpose drilling machine, and a line of form shapers for producing cams, clutches, sprockets, and special external forms are featured this week. Also highlighted are high-speed welding equipment, grinders, a hot plate press, and pumps.

Cylindrical Grinding Machines

THREE different types of a plain cylindrical hydraulic grinding machine have been announced by *Landis Tool Co.*, Waynesboro, Pa. Type F plain swings 14 and 16-in. work weighing up to 6500 lb. Length between centers ranges from 36 through 48, 72, 96, 120, 144, to 168 in. Made for grinding heavier work, the type FF plain will carry work weighing up to 10,000 lb between centers, and in swings of 16, 20 or 24 in. The FF machine may be had in 48, 72, 96, 120, 144, 168, 192, 216 or 240-in. lengths between centers. For grinding rolls weighing up to 10,000 lb, type FR machine is made in 16, 20 and 24-in. swings and includes built in crowning and concaving mechanism. Center distances range from 48 to 168 in. in the usual increments. All three types use a 30x3 x12-in. wheel as standard equipment. New features include Microsphere wheel spindle bearings which are pressure lubricated and immersed in lubricating oil. The headstock is constructed for V-belt drive from motor to jackshaft and jackshaft to face plate, and a reversible hydraulic motor is used for moving the carriage.

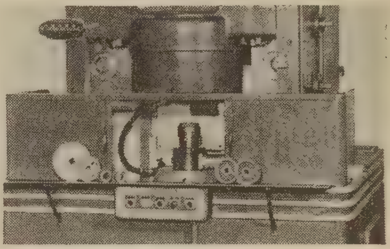
Drilling Machine

DEVELOPMENT of a high-production special processing machine for drilling, reaming and counterboring automobile engine connecting rods and caps has been announced by *Sommer & Adams Co.*, subsidiary of Federal Machine & Welder Co., Warren, Ohio. The machine, which is over 11 ft high and weighs 36,000 lb is designed to produce over 240 drilled, reamed and counterbored assemblies per hour with a single operator. Spindles are controlled for tool setup purposes through manual controls on each of the five individual stations. The machine has an automatic cycle for continuous operation and is equipped with a motor driven hydraulic unit for indexing and locking the table. The hydraulic system employs a variable displacement pump which automatically adjusts itself for proper pressure. Each station has a selfcontained hydraulic system. One motor on each unit operates the multiple-spindle drill head through a train of gears, and each head is adaptable for drills, reamers and counterborers. The equipment is supplied with a motor-driven coolant pump delivering 75 gpm.



Form Shapers

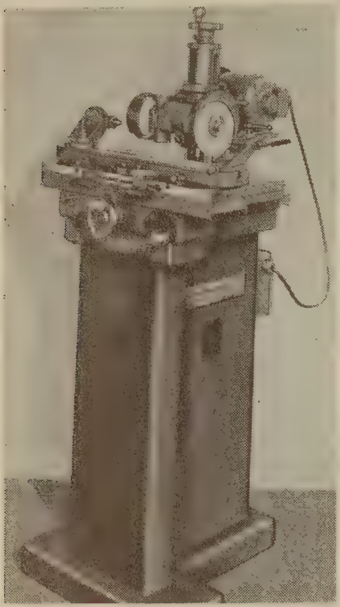
AVAILABILITY of Shear-Speed shapers for producing other shapes than gears has been announced by *Michigan Tool Co.*, 7171 E. McNichols Rd., Detroit 12. Among the various types of parts which these shapers cut in one set-up are the following: Cams of various types, including overrunning clutches; splines, both straight sided and involute; toothed clutches, ratchet wheels, sprockets, and miscellaneous special external forms. Shapes are cut by formed tools which feed in radially from all sides during the cut. The work is reciprocated while the tools are fed in to correct depth. Tools are automatically retracted for relief on the return stroke. Feed is automatically adjusted during the cutting cycle to approximately balance the cutting load on each stroke. Thus a fairly coarse feed is used during the first strokes, while the tools are entering the cut, while the feed becomes finer as more of the cutting edge of the tools is being employed. The line is designed to handle parts up to 10 in. diam and 2¾ in. face width.



Cutter and Tool Grinder

FOR smaller toolroom sharpening jobs, particularly end mills, *Brown & Sharpe Mfg. Co.*, Providence 1, has built the No. 5 cutter and tool grinding machine having a table which slides on 36 precision-ground rolls and featuring a double-ended ball bearing wheel spindle permanently lubricated. Centers swing 6⅜ in. in diameter. Greatest distance from center line of work to center of wheel spindle is

8⅛ in. and the least distance is 1⅝ in. Greatest distance from center of wheel spindle to top of table is 6⅞ in. and the least distance is 1⅜ in. The spindle slide upright has 4½ in. transverse movement and 3 in. longitudinal adjustment with the transverse adjustment hand wheel graduated to read to 0.001 in. Wheel spindle slide has vertical adjustment of 5½ in. with wheel elevating hand wheel graduated to read to 0.001 in. Additional equipment is available for work requiring indexing and formed cutter sharpening.



Stainless Steel Welding Flux

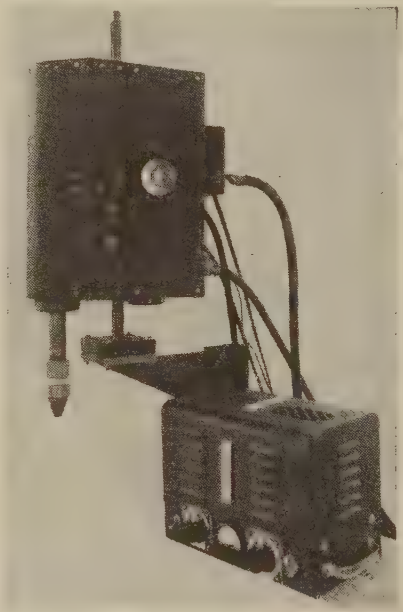
A NEW flux for oxyacetylene welding of stainless steels and high chromium bearing alloys has been announced by *Air Reduction Sales Co.*, 60 E. 42nd St., New York 17. Designated Formula No. 34, the flux was specifically compounded to dissolve the chromium oxides encountered in welding stainless steel and high chromium bearing alloys. Application by painting the immediate and surrounding surfaces to be welded protects the molten metal from the air thus preventing oxidation.

Gas Welding Rod

A WELDING rod designated as EutecRod 188 and having a maximum hardness of 67 Rc, has been marketed by *Eutectic Welding Alloys Corp.*, 40 Worth St., New York. Overlays on copper are produced in a single pass and require no additional heat treatment, it is reported. The alloy has a bonding temperature of 1800°F and is said to remelt at 1950°F. In addition to producing overlay hardness on copper, the alloy is recommended for application to steel and ferrous metals. It is claimed to be resistant to corrosion, including nitric, acetic, phosphoric, tartaric and citric acids.

Heliwelding Equipment

FOR high speed welding of light metals such as stainless steel and nonferrous metals, *Air Reduction Sales Co.*, 60 E. 42nd St., New York, has announced two Heliwelding units consisting of a machine type electrode holder and an automatic unit. The machine holder was designed for mounting on a Radiagraph or other suitable travel mechanism for moving along the joint or for fixed position use with the work moving beneath the arc. It has the same barrel and rack as standard 1⅜-in. diam machine gas cutting torches. The Heliweld unit, illustrated, has been designed for continuous operation, and consists of a holder, holder carriage and a control box. This unit is electronically controlled, automatic, and said to maintain constant arc length. By compensating for setup irregularities, it is said to assure a continuous weld of consistent dimensions and quality. Both units have a welding current capacity of 300 amp and are insulated for high frequency current required for arc-starting and stabilization in welding.



Hydraulic Pump

A CONSTANT displacement, hydraulically balanced pump designed for continuous duty at 1000 psi operating pressure, has been added to the line of hydraulic equipment manufactured by *Sundstrand Machine Tool Co.*, Rockford, Ill. Pressures up to 1500 psi may be utilized for intermittent service. Pumps are available in capacities ranging from 2 to 75 gpm with three basic sizes covering this range, and interchangeable cartridges providing four capacities within each of the three basic sizes. This cartridge subassembly is said to simplify inspection and service, and to facilitate change of pump rotation and capacity within the range. The intermediate size in either of four capacities of 10, 13½, 20½ or 27½ gpm, at 1000 psi, is available at present. Other features include large displacement within relatively small housing, new mechanical oil seal design, and multi-porting connecting all pumping areas to assure unrestricted flow.

Hot Plate Press

A 50-TON upward-acting hot plate press has been designed by the *Hydraulic Press Mfg. Co.*, Mt. Gilead, Ohio, for laboratory or small production pressure processing, where heat is required. A convenient hand lever controls the self-contained hydraulic power unit. Adaptable to either steam or electrical heating, the machine has two 20 x 20 x 1½ in. hot plates for handling laminating and curing work.

WHEN *You want*

BURNER PRESSURE, MODULATION, MULTIPLE FEED, UNIT ADJUSTMENT

LOWER MAINTENANCE, ACCURATE OUTPUT, IN YOUR BUTANE-AIR PLANT

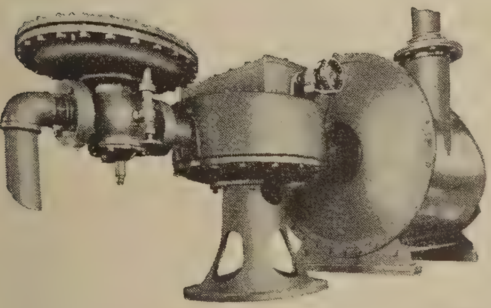
EFFICIENCY AT ALL LOADS WITHOUT CONTINUOUS VALVE-TWISTING

THEN *You want*

Pressure-Carbureted KEMP Combustion

The KEMP Industrial Carburetor gives You a precisely proportioned mixture, precisely uniform pressure, automatic response to overall or individual burner demand. It frees the "valve-twister" for productive work. In day-in-day-out service KEMP Carburetors build 15 to 20-year records of complete unpampered dependability. If you use Kemp Burners with them you have added perfection to perfection.

6 SIZES 4500 TO 120,000 C. F. H. !



Left to right: the Regulator reduces entering gas to 0 pressure; the carburetor mixes it with air in unchanging but adjustable proportion; the blower takes over the mixture and delivers it at desired pressure. At minimum or full capacity, automatically responding to demand, air-gas ratio is identical and fuel cost in exact proportion to heat units delivered.

KEMP of BALTIMORE

PRECISION CARBURETION + ADAPTED COMBUSTION FOR INDUSTRY'S HEAT USING PROCESSES
ATMOSPHERE GENERATION & ADSORPTIVE DRYER SYSTEMS
FOR PROCESS CONTROL AND PROTECTION

JMLco K-M1 ia

C. M. KEMP MFG. CO.
405 E. Oliver Street, Baltimore 2, Md.

Send me literature on your Series S Carburetors ☐

Send your nearest engineer to discuss our firing system ☐

NAME__________

TITLE__________

COMPANY__________

PLACE__________

Assembly Line . . .

WALTER G. PATTON

• New Hudson requires extensive changes in plant and assembly lines . . . An all-steel "Monobilt" frame is featured . . . Reuther seen heading third round wage drive.

DETROIT—Public reaction to the new Hudson which went on display in dealers' showrooms throughout the country this week has been unusually favorable according to reports received here in Detroit.

Combining an unusually low center of gravity with increased roominess and engineering features which promote good riding qualities has presented several unusual problems to Hudson engineers, including a completely revised manufacturing technique.

The specifications which were released this week show that the new Hudson construction will feature an all-steel, box-section frame which is built into the body and extends both outside and inside the rear wheels. According to Hudson engineers, this "Monobilt" construction offers "the strongest, most rigid, twist-free body-and-frame ever built."

There are eight-transverse cross-members some of which are 6 13/16 in. deep. These members are joined by four longitudinal members, two of which are actually outside and enclose the rear wheels. Vertical members extend upward from the outside rails to the roof. Body and roof panels are then welded directly to these structural body-and-frame members.

This new construction has permitted lowering of the floor of the car about 6 in. The lowered floor and roof together with the more forward position of the passenger compartment has made it possible to produce a 5 ft car with plenty of headroom. According to Hudson engineers, road clearance has not been sacrificed in the new design.

Passengers occupying the rear seat of the new Hudson will ride 2 ft ahead of the rear axle. This positioning of the passengers plus the fact that the engine has been moved forward has changed somewhat the distribution of weight of the new car.

Front springs are of coil type and the rear spring design has leaf-type members. Airplane-type shock absorbers are used on all wheels and the new super-cushion tires carry lower air pressures than the old standard equipment. The rear sway bar has been redesigned and is rubber mounted at both ends.

IN line with what appears to be the growing trend in styling, the fenders of the Hudson, both front and rear, have been absorbed into the body and are continuous from headlights to tail lamps. What the engineers call a "speedline" has been designed into the fenders and body in the form of an embossed panel beginning at the front wheels and extending to the rear. In addition to adding stiffness to the construction, the "speedline" is said to add a sense of length to the car. At the present time, Hudson is also taking advantage of this new design to feature of a new kind of two-tone color treatment.

A wide stainless-steel strip extending from the front wheels to the rear of the car and across the bottom also adds to the appearance of length.

The new front grille has five louvers. Heavy wrap-around bumpers are recessed into the body, with the rear bumpers being bolted directly to the frame instead of being mounted on brackets. Another feature of the new Hudson is the four box-type jack pads located directly inside the bumpers. These are so designed that the car cannot slip off the jack once the jack head is placed in the jack pads. Door handles are trigger operated and are a type that is new to the industry.

Some appreciation of the increase in visibility in the new body type is indicated by the fact that the new curved windshield has 167 sq in. more visual area than the 1947 models. This is an increase of 28.3 pct. A corresponding increase in the angle of vision accompanies this change. Similarly, 128 sq in. or 27.4 pct has been added to the visual area in the rear window.

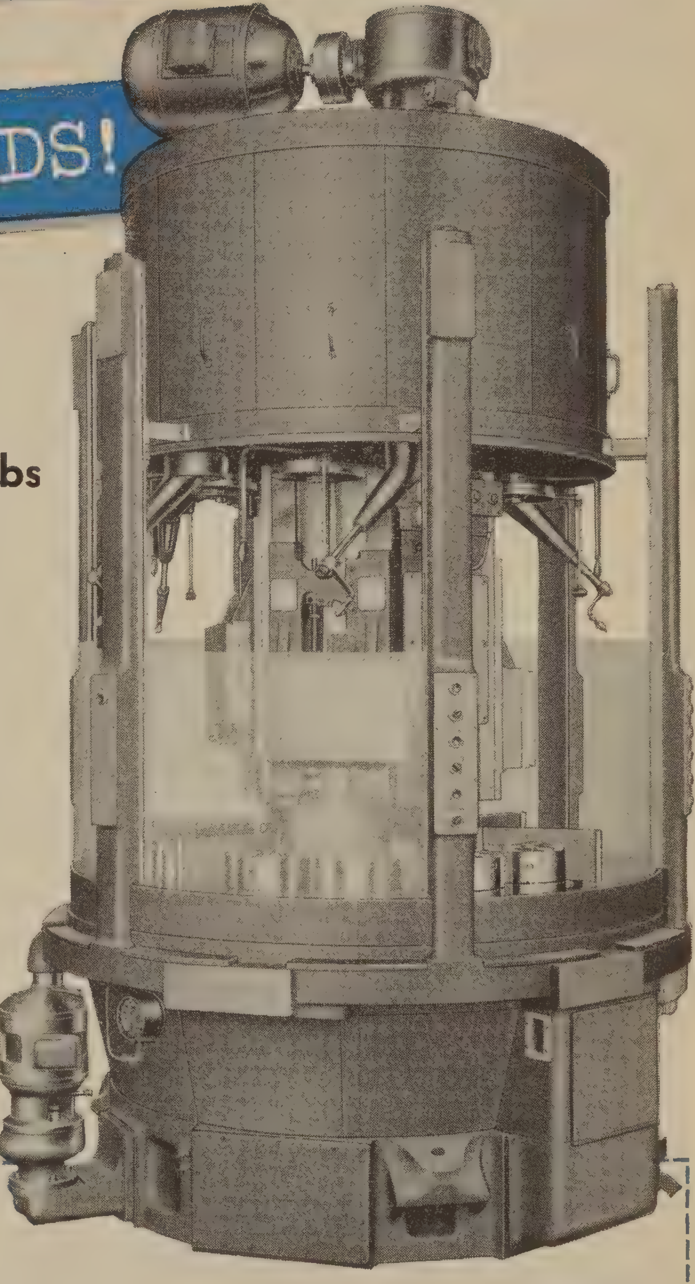
Because of the new styling, Hudson has been able to get 64 in. of seat room in front and 63 in. in the rear. A novel arrangement of recessed door panels gives an extra 2 in. of elbow room to all passengers, according to Hudson engineers.

The instrument panel is finished in dark walnut and dials on the instrument feature a design in which extruded light-bending plastic is used in such a manner as to bring light only to the figures on the dials and instrument needles. The needles are red illuminated plastic.

CONTINUING a Hudson design feature of the 1947 model teleflash signals automatically flash a red warning light when the generator is not charging or when oil pressure drops below the safety limit.

A completely new super-six engine rated at 121 hp is available in the new line. The new L-head motor is pressure-lubricated at 41 points. The engine has a bore of 3 9/16 in. and a stroke of 4⅜ in. Compression ratio is 6.5 to 1 with

OUT TO BREAK SPEED PLUS ECONOMY RECORDS!



The New BULLARD Type "K" Mult-Au-Matics Set the Pace For Small and Medium Sized Jobs

This new machine brings greatly increased spindle speeds and the economies of quicker indexing time to small and medium sized jobs of cast iron, steel and light metal alloys such as aluminum and magnesium. New features include:

1. Higher Spindle Speeds—41 speed changes, 82 rates of feed, selective feeds and common speeds at all stations. And spindle speeds have been increased up to 900 rpm . . . *three times the speed ever before available.*

2. Less Time For Index Cycle—Chucks are automatically opened at the loading station, and closed by a foot treadle. Operator's hands are free for proper chucking, and the carrier automatically indexes when the last operating head returns to "neutral"

3. Twin Spindle Applications—Offering to small jobs a choice of advantages — two pieces for every machine index cycle, or double the production. (Single spindles available if required.)

4. Spindle Gear Synchronizing—Gear life is greatly increased by the incorporation of spindle gear synchronizers.

In design, construction and performance, the new Type "K" Mult-Au-Matic offers many advantages worth investigating for your own production . . . Write for details. THE BULLARD CO., Bridgeport 2, Conn.

The BULLARD Type "K" Mult-Au-Matics for work up to 10" in diameter, are available in four models; 6 or 12 spindles with spindle speeds at 100 to 900 rpm, and 8 or 16 spindles with spindle speeds at 98 to 883 rpm.

BULLARD

BULLARD CREATES ***NEW METHODS*** TO MAKE MACHINES DO MORE a high-compression aluminum head. The crankshaft has four steel-shell, pressure-lubricated, precision main bearings. A dual-down-draft carburetor with two carburetors incorporated in a single housing makes it possible to feed 3 cylinders with each carburetor.

The improved Super-Eight L-head engine is rated at 128 hp with a bore of 3 in. and a stroke of 4½ in. Compression ratio is 6.5 to 1, but a special aluminum head is available which offers a higher compression ratio. The new camshaft is phosphate treated and an aluminum intake manifold is specified. Aluminum alloy T-slot pistons are used with plated piston rings. Hudson continues to use chrome alloy cylinder blocks.

The new low floor of the car has been made possible by the use of a new two-section propeller shaft. Three universal joints are incorporated in the propeller-shaft train. A steady bearing at the rear end of the front shaft is insulated from the frame by a large rubber mounting. According to Hudson engineers, this construction minimizes whip and makes it possible to use a propeller shaft of comparatively small diameter.

Hudson's Drive-Master automatic transmission permits completely automatic drive without clutch or gear shift, manual gear shifting without the use of a clutch or conventional driving.

Two lines, the Hudson Super series and the Commodore series are available with a choice of 121 hp or 128 hp engines. Both lines have a wheelbase of 124 in. and an overall length of 207½ in. Body types are offered in 12 solid colors and 5 two-tone combinations.

TO bring out its new model Hudson spent $16 million for new tooling and plant expansion. In the main plant, a 40-ft $125,000 Natco handles 12 cylinder blocks at a time and bores camshafts and crankshafts. Another Barnes machine performs 7 block operations simultaneously on 8 blocks. New automatic machinery for grinding camshafts has been installed. At its Gratiot plant, Hudson now has about 700 presses stamping out fenders, hoods, doors, etc.

In view of the fact that on the new car numerous assemblies are put on the bodies instead of being installed on the chassis as in previous models, a longer body line has been provided. Meanwhile, the former chassis line had to be shortened since it handles only the front component of the new car.

Assembly of the new unit begins on the first floor of Hudson's Gratiot plant. Roof and windshield panels, frame and under body assemblies are brought together with the body structure assembly. On the second floor, the internal work, including door hanging and rear fenders, is completed. After inspection and finishing the body goes to the fourth floor of the building for washing, metal treatment, drying and subsequently into the paint line.

From the Gratiot plant the body is transported to the main plant where the new car assembly line now starts on the first floor, building 14. The conveyor continues from building 14, second floor, thence across the newly constructed bridge to the third floor of building 11, thence through subsequent operations until the final assembly is completed.

According to Hudson officials, whole departments had to be shifted within the Gratiot, Axle and Main plants to make possible the new Hudson assembly line.

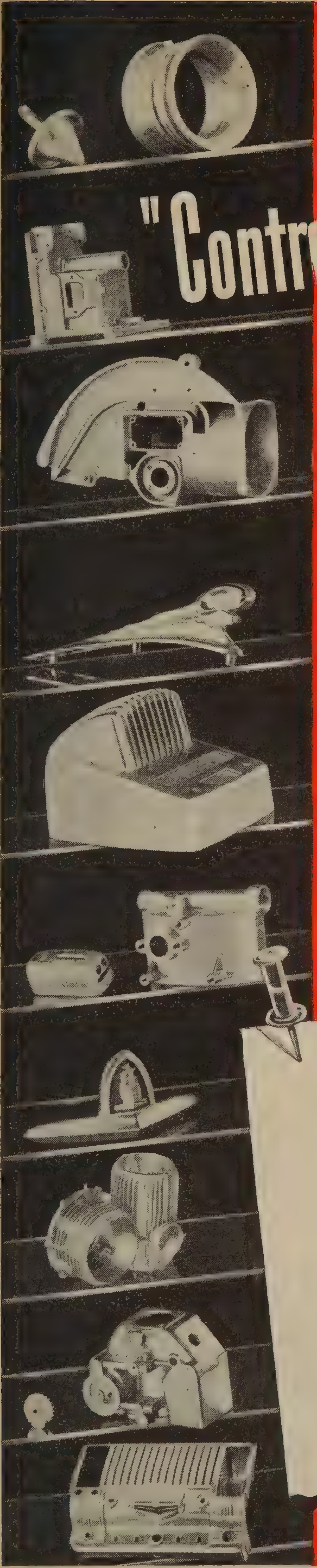
According to recent information, Hudson has already produced more than 5000 of the new models of the Eight series, and production of 6-cylinder jobs was recently started.

* * *

Talk has already been heard in Detroit that the UAW-CIO may lead the drive for the third round of automotive wage increases during the postwar period. This week it is recalled that Chrysler Corp. contracts can be reopened on 60 days' written notice, but the GM agreement with the UAW and the United Electrical Workers cannot be reopened until Feb. 28. This week Reuther took steps to cut $500,000 annually from the UAW's operating expenses, presumably to swell the union's strike fund to the million dollar mark.

Reuther frankly admitted that the assumption could be made that he was streamlining the union for the next wage drive. The UAW-CIO president said he would prefer to roll back prices by at least 12½ pct rather than boost wages, but most sources believe this could not possibly be done under existing conditions.

SCALE MODEL A-PILE: *The basic elements of an atomic power plant are shown in this model built by GE scientists. Pictured demonstrating the pile is Dr. Kenneth H. Kingdon, head of the atomic power division of the GE laboratory, who was one of the first physicists to isolate Uranium* 235.



"Controlled Metals" for dependability

AUTO-LITE MEANS PRECISION MANUFACTURING

AUTO-LITE

Die Castings

AUTO-LITE has assured dependability in die castings through its "controlled metals" inspection processes. This revolutionary technique, together with the finest equipment for aluminum and zinc die casting, machining and every type of finishing, is proving of practical benefit to many of America's leading manufacturers.

THE ELECTRIC AUTO-LITE COMPANY, *Die Casting Division*
600 S. Michigan Ave., Chicago 5, Ill. • 723 New Center Bldg., Detroit 2, Mich.

Tune in the Dick Haymes Show for Auto-Lite,
Thursday Nights, 9:00 P.M. — E.T. on CBS

Washington . . .

EUGENE J. HARDY

• Steel allocations cold-shouldered by Congress . . . Legislators believe powers requested too broad . . . Export data should remain secret . . . Russian exports likely to drop under European Recovery Program.

WASHINGTON — White House plans for steel allocation have thus far been met with cold hostility on Capitol Hill. Much of the Congressional opposition can be laid to the bumbling tactics of the administration witnesses who have appeared on the Hill, including representatives of the Agriculture, Interior and Commerce Depts., all of whom seemed almost frantic in their efforts to get in their licks at the steel industry as the culprit whose reform would open an easy path to economic security. It is little wonder that Congressional leaders doubt the sincerity of the administration approach to the problems of inflation.

While the administration has gained some allies on the Senate side among Democrats and Republicans, the opposition to controls on steel and other commodities in the House is almost unanimous.

The major reason for the chilly reception given President Truman's request for authority to limit distribution and uses of steel is, of course, the natural reluctance of many Democrats and Republicans to believe that the economy is in reality faced with a need for such controls.

But an underlying—and potent—reason for the cold shoulder in both Senate and House is Commerce Secretary Harriman's employment of diplomatic double-talk in place of the detailed justification for industrial regimentation that both parties had expected.

Majority members of both sides of Capitol Hill are annoyed and irked at Mr. Harriman's request for blank check allocation powers and his evasiveness in describing the extent to which he would use such powers, if granted. Senator Taft, R., Ohio, chairman of the Joint Economic Committee, repeatedly asked Mr. Harriman in a recent committee hearing how the executive branch of the government would attempt to limit its allocation authority, but Mr. Harriman declined on each occasion to give a forthright answer.

Rep. Wolcott, R., Mich., chairman of the House Banking Committee, dropped his usual calm manner in another hearing to tell Mr. Harriman tartly that the administration's request for renewed controls was the "vaguest" program he had heard in 14 years of service in Congress.

PRESSED for details as to how the Commerce Dept. would proceed if granted allocation powers, Mr. Harriman told Senator Taft's group he would first set up in his department an administering board consisting of government experts and businessmen. Next he would invite industry officials to discuss in open hearings what voluntary measures might be taken.

"Industry is usually ready to cooperate," Mr. Harriman told Mr. Wolcott's committee, "but it is necessary to have these powers to bring into line the minority who might be unwilling to cooperate." He then went on to name the three devices he would employ for enforcement purposes as: (1) price controls, (2) allocations, (3) voluntary action on the part of industry.

He pointed out that some steel consumers are paying about twice the list prices for steel items and declared his belief that allocations and price controls would be the two best devices "to stamp out practices which are causing hardships."

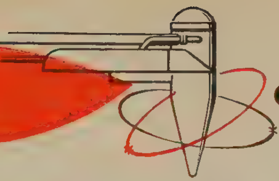
Steel, Mr. Harriman said, is the only industry for which he is prepared to make specific recommendations for control powers. He outlined his proposed control area as one embracing first a reduction of consumption in "nonessential uses," and secondly channeling of "small amounts" into "essential uses," leaving the largest area to "normal distribution."

Mr. Harriman envisages the new controls — if granted — as being lodged within the respective department or agency normally having jurisdiction over the particular commodity or product. Under such an arrangement, the Agriculture Dept. would handle foods, the Interior Dept. would handle fuels and the Commerce Dept. would handle other materials and products.

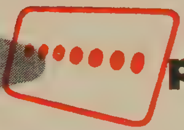
"By the use of limited priority powers over steel, I believe we could direct a small proportion of steel to the most essential programs," he told the House group. "The increased production of freight cars, so greatly needed by our domestic economy, is a case in point. Another example is that steel and iron may be made available for increased production of farm equipment so essential to maintain our own food production on high levels and to increase food supplies in other countries. Other examples might be soil pipe, nails, oil pipe and other materials for oil production and distribution."

THE Commerce Dept., Mr. Harriman disclosed, has "sufficient information about steel to feel certain that substantial benefits would result from use of priorities and set-asides to channel steel to the most essential uses, and to limit its use in less essential purposes."

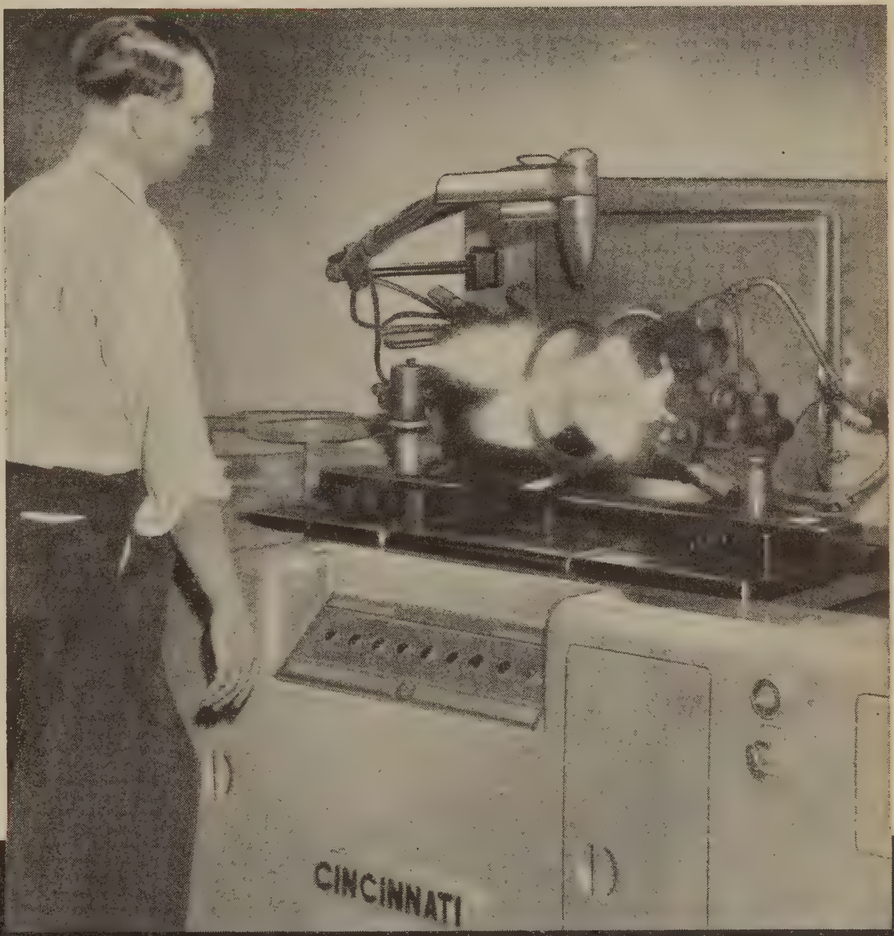
Steel industry spokesmen are still smouldering over the double-

this  **electronic temperature control**

reduces this **ring gear hardening job**

to this  **push-button simplicity**

PATENTS PENDING



. . . and with low initial investment. A case in point: the Flamatic shown at the right surface hardens ring gears for the Springfield Mfg. Co. up to 250 per hour, gives better physicals, better uniformity, and simpler operation than ever before practical in production quantities. And the original investment in Flamatic was substantially lower than other equipment of equivalent capacity! High temperature flames heat the part rapidly to within plus or minus 5° F. of preset temperature, followed by the quench. Full surface hardness is developed, core properties are unaffected. Check the performance of this new machine on gears, pinions, cams, shafts, and other "parts of rotation."

Write for 20-page catalog, Publication No. M-1611.

CINCINNATI

THE CINCINNATI

flamatic

HARDENING MACHINE

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO, U.S.A.

talk handed them by Mr. Harriman behind closed doors last month. They feel that the Secretary of Commerce should be industry's man, and they are slightly bitter that Mr. Harriman listened politely to their stand against allocations, avoided positive statements and less than 24 hr later went to Congress with a 21-page statement asking for power to regiment the industry.

Similarly, members of Congress feel that Mr. Harriman is being less than frank with them. While the art of speaking much and saying little carried Mr. Harriman far in his diplomatic relations with Russia and subsequently Britain, such tactics can hardly be expected to sell a Republican-controlled Congress on the idea of further dabbling with controlled-economy measures. Congress—particularly the House—is far from convinced at this point that Mr. Harriman is right.

* * *

CONFIDENTIAL information about exports submitted by business firms to the Commerce Dept. is slated to remain confidential.

Legislation (H. Res. 366) passed last week requires the Secretary of Commerce to submit to the House complete information concerning shipments and unfilled orders of steel and industrial goods to foreign countries since Jan. 1, 1947.

But these business records can be made public only by decision of the House Interstate Commerce Committee to release them. And the chances of such revelation are slight. Chairman Wolverton, R., N. J., of the House Interstate Commerce Committee, respects the good faith in which business firms submitted their figures to the Commerce Dept. and has no intention of causing them unnecessary embarrassment.

Specifically, the new law requires the Secretary of Commerce to furnish the House with "complete information concerning the shipments of heavy machinery, farm equipment, railroad equipment, motor vehicles, metals and metal products (including tubular steel), coal, petroleum and petroleum products, building materials, meats and grains, and all other supplies, shortages of which might endanger the national defense or security, which have been made to each foreign country between Jan. 1, 1947, and the most recent date for which figures are obtainable."

The Secretary of Commerce also is required, under the new law, to supply this information in "complete detail," including names of firms or individuals making sales, dates on which orders were received and supplies delivered, and the nature of the payments made in return for such supplies. The Secretary also is required to supply information as to unfilled orders for the same group of commodities listed above.

Earlier, Under Secretary of Commerce Foster told a trade study group headed by Rep. Mundt, R., S. D., that it would be unwise to jeopardize the success of the European Recovery Program by damaging in any way the confidence of American businessmen in the government's policy of keeping private the facts about individual export transactions.

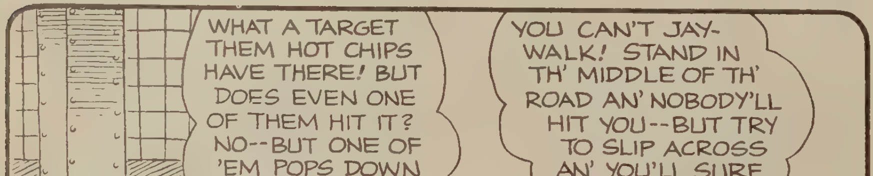
"We believe it would be incompatible with the public interest to disclose this information at this time," Mr. Foster declared. "One reason for the willing cooperation of businessmen with the government is that businessmen know the government will not publish private trade information."

Mr. Foster pointed out that the U. S. has benefited by importing certain raw materials from the U.S.S.R. So far this year, we have received from the Soviets $6.2 million worth of chrome ore, $5.5 million worth of manganese ore, $2.9 million worth of platinum, and $1.3 million worth of cotton linters, he disclosed. A third of the manganese ore, half of the chrome ore and more than half of the platinum imported into the U. S. this year came from the Soviet Union, he stated.

But the U. S. policy with regard to exports to Russia may have to be modified when the European Recovery Program gets under way, Mr. Foster admitted.

"This will not mean that Russia will be singled out for discrimination, but it will mean in practice that some licenses will have to be refused until we can be sure that we are furnishing the 16 countries of Western Europe with the goods necessary for carrying out the European Recovery Program," Mr. Foster stated.

THE BULL OF THE WOODS BY J. R. WILLIAMS


WHAT A TARGET THEM HOT CHIPS HAVE THERE! BUT DOES EVEN ONE OF THEM HIT IT? NO--BUT ONE OF 'EM POPS DOWN A NECK WITH A CHOKER ON, JUST PASSIN' BY!
YOU CAN'T JAY-WALK! STAND IN TH' MIDDLE OF TH' ROAD AN' NOBODY'LL HIT YOU--BUT TRY TO SLIP ACROSS AN' YOU'LL SURE GET IT!
T. M. REG. U. S. PAT. OFF. COPR. 1947 BY NEA SERVICE, INC.
THE DIGNITY DAMPERS
12-12
J.R.WILLIAMS

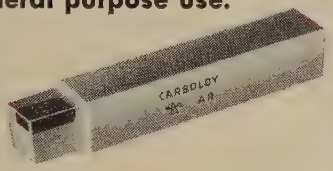
Now! MORE THAN *600* CARBOLOY® STANDARDS

CEMENTED CARBIDE

. . . FOR MAXIMUM RESULTS WITH CARBIDE TOOLING

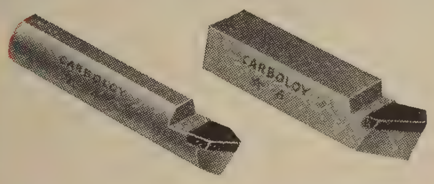
. . . OVER 80 STANDARD TOOLS!

for general purpose use.



One of 11 standard styles

. . . OVER 60 STANDARD BORING TOOLS!



two of the 7 styles available

. . . OVER 180 STANDARD BLANKS!

for cutting tools.

A few of the many shapes available

. . . OVER 300 STANDARD WEAR—RESISTANT BLANKS!

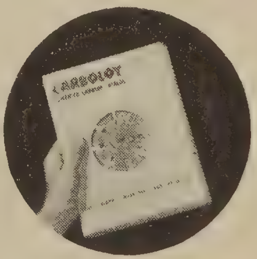
typical examples of available shapes

Looking for ways to increase production . . . to reduce manufacturing costs . . . to meet and beat Today's competition.

HERE'S THE ANSWER . . . get greater carbide tool effectiveness . . . with the greater advantages you get in low-cost Carboloy "Standards."

More than 600 Carboloy "Standards" . . . cutting tools and blanks . . . ready for instant use . . . are "on-the-shelf" . . . stocked for *speedy delivery* by local distributors in 74 cities coast-to-coast. Why not look into the unusual benefits in Carboloy Cemented Carbides . . . get maximum results through greater carbide tool advantages.

Have you seen the *New* 1948 Carboloy Tool Catalog—just published? This 64-page illustrated catalog . . . most comprehensive in the cemented carbide industry . . . is literally packed with cost-cutting "Standards" and their applications . . . a veritable abundance of Carboloy Cemented Carbides to handle 60%—80% of your machining needs. Send for your FREE copy TODAY! Carboloy Company, Inc. 11153 E. 8 Mile Street, Detroit 32, Michigan



AUTHORIZED CARBOLOY CEMENTED CARBIDES DISTRIBUTORS

Standards are stocked in 74 cities coast-to-coast

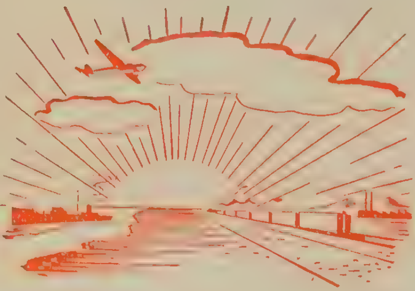
CARBOLOY

CEMENTED ® CARBIDES

West Coast . . .

ROBERT T. REINHARDT

• Japan is offering 15 to 1 ratio on scrap-for-tinplate barter contract . . . Merchant iron supply may ease in West . . . Union leaders face test of strength.



LOS ANGELES—Odds of 15 to 1 on any sporting event will usually bring out plenty of takers, but whether 60,000 tons of Japanese scrap offered in barter for 4000 tons of American tinplate will get any response is yet to be seen.

Hubert D. Long, local importer and exporter who just returned from Japan, last week received cabled confirmation of his contract with Boeki-Cho, the Japanese government's board of trade, which authorized him to sell 50,000 metric tons of No. 1 heavy melting scrap containing 2 pct alloy, 7500 metric tons of steel plate, and 3400 metric tons of hot rolled round bars in this country if he can also arrange for the shipment of 4000 metric tons of tinplate to Japan.

The steel scrap is to be delivered on the eastern seaboard at the price quoted by THE IRON AGE or its equivalent on the day shipment is made from Japan. The price of the tinplate is established as of the day shipment is made from this country.

According to Mr. Long, the desperate need for tinplate in Japan for the packing of fish and food brought about authorization of this deal by the Japanese government with the full sanction of the economic staff of General MacArthur.

With orders pending from the Commerce Dept. restricting the use of tinplate for manufacture of containers for beer, coffee and various non-food products, some observers are highly doubtful whether authorization for export of the tinplate from the office of International Trade of the Dept. of Commerce could be secured. However, according to Mr. Long, the need for tinplate to preserve food in Japan is so great that he is confident that if it proves necessary, presidential intervention might be secured.

As reported (THE IRON AGE, Oct. 23, 1947, p. 103), the first quarter quota for tinplate exports in 1948 will remain at 120,000 tons. The proposed export of 4000 tons of tinplate to Japan would mean earmarking approximately 3 pct of the first quarter's quota for that purpose. It is possible, of course, that the 4000 ton shipment could be taken from the 22,000 tons additional tinplate which is expected to be licensed on a non-rated basis in packaging food for import into this country. It is recognized that proposed exports will fall short of actual foreign food packaging needs by more than 41,000 tons, according to the Office of International Trade.

A further inducement to consummate this barter deal is the willingness of the Japanese government to export a sufficient quantity of tin to produce the tinplate required. Such a transfer of this metal which is under the control of the Combined Tin Committee would require special sanction, it is believed.

The 50,000 metric tons of No. 1 heavy scrap is all prepared, according to Mr. Long. The 7500 metric tons of steel plate runs in thickness from 1.2 in. to 12 in. and in various widths and lengths. Analysis of 5000 tons of the plate offered is given as: carbon, 0.30 to 0.53; manganese, 0.30 to 0.45; phosphorus, 0.035 max.; sulphur, 0.045 max.; silicon, 0.35 max.; nickel, 2.50 to 4.20; chromium, 0.80 to 2.20; copper, 0.025 max. Approximately 2000 tons have the same analysis except the copper runs from 0.09 to 0.13.

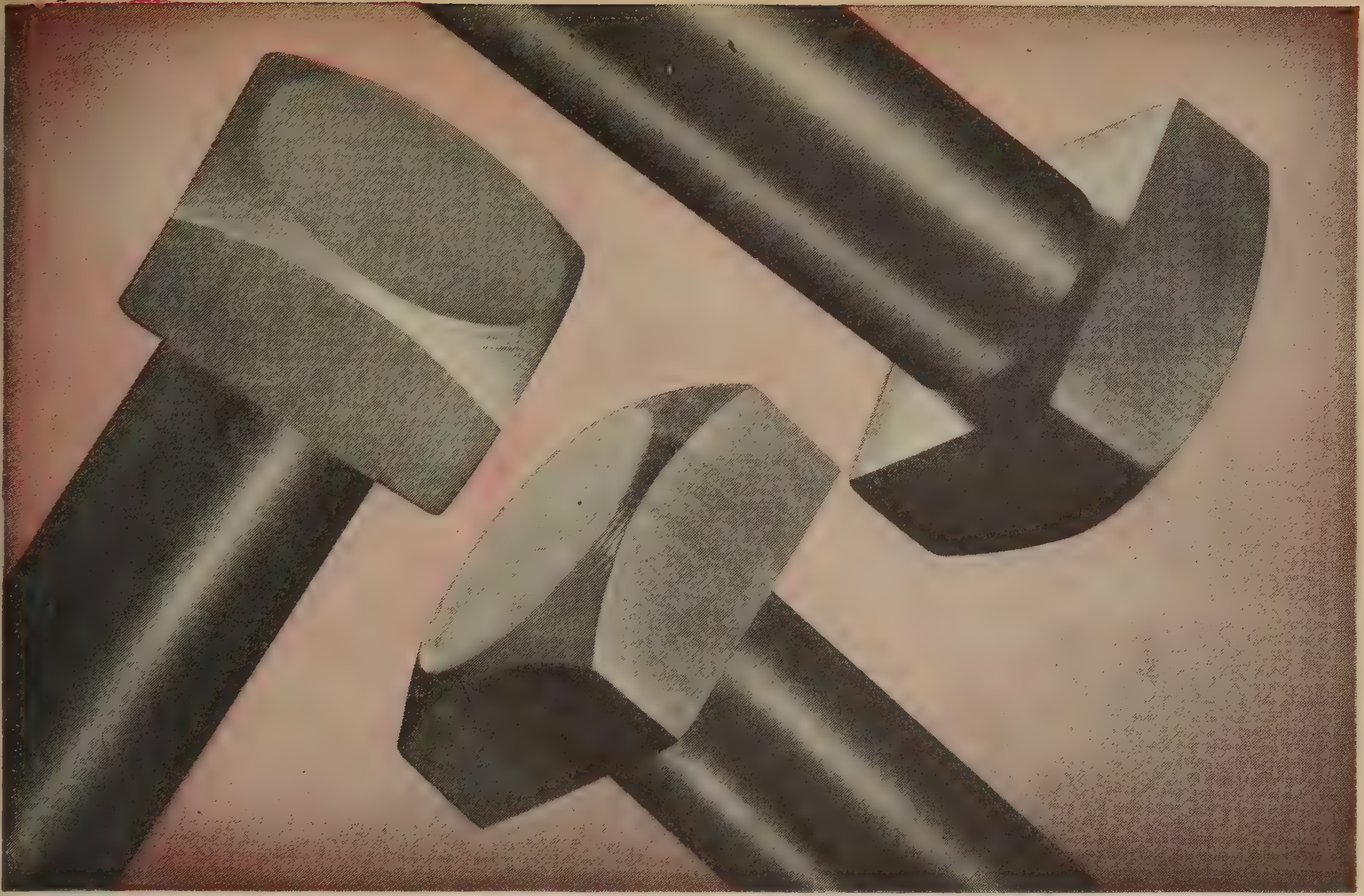
The 3400 metric tons of hot rolled round bars range in diameter from 4.3 in. to 15.7 in. and between 5 ft and 20 ft in length. The analysis of this material is given as: carbon, 0.45 to 0.65; manganese, 0.80 to 1.20; phosphorus, 0.05 max.; sulphur, 0.05 max.; silicon, 0.50 max.

UNDER the terms of the contract which Mr. Long is attempting to negotiate, whoever buys the scrap will be expected to place an employee in Japan to inspect the material there and supervise its loading and make an acceptance receipt for the mill at that time. Sale of the scrap to an Eastern steel producer is desired because of the differential in the price of scrap between the East and West Coast. It is believed that the cost of bringing the material directly to the East Coast would run approximately $4.00 per ton more and the Japanese government believes that this small added cost would be more than justified because of the sale price differential.

Mr. Long has already begun negotiations with several steel mills and, reportedly, has not only the sanction but active support of a large consumer of tinplate in this country which, although already hard pressed to get delivery of as much tinplate as it wants, is willing to encourage the transaction for the general welfare of the steel producers who are in need of scrap.

Mr. Long reports that during his recent two months stay in Japan he became convinced that that country could export hundreds of thousands of tons of scrap without affecting its own steel production in any degree. It is his hope and belief that if this present barter venture proves feasible that further shipments of Japanese scrap will be forthcoming.

Incidentally, Mr. Long reports having witnessed the sale of several thousand tons of scrap in Honolulu for delivery to New York at $42.50 per ton and that some of these transactions were predicted upon pledge from mills to deliver one ton of sheets for every four tons of No. 1 heavy scrap received. It has been impossible to confirm



WHEN YOU SAVE PRODUCTION TIME BY USING FEWER TYPES AND SIZES...THAT'S t.f.e.

True Fastener Economy!

It's the cost of using a fastener that counts

And an important part of the cost of using a fastener is the cost of maintaining inventories, requisitioning from stock, handling many different styles and sizes. Careful analysis of fastening requirements and standardization on fewer types and sizes will help to speed up production and lower costs.

R B & W *Machine and Carriage Bolts Offer You Unlimited Variety*

RB&W engineers are available to help you determine the minimum variety of types and sizes of bolts and nuts which will meet your needs. And RB&W offers the maximum range of product, a choice of many special metals, and the facilities of a versatile finishing department—from a *single* source of supply.

You Get T. F. E. *When You*

1. Reduce assembly time to a minimum by savings through use of accurate and uniform fasteners
2. Make your men happier by giving them fasteners that make their work easier
3. Reduce need for thorough plant inspection, due to confidence in supplier's quality control
4. Reduce the number and size of fasteners by proper design
5. Purchase maximum holding power per dollar of initial cost, by specifying correct type and size of fasteners
6. Simplify inventories by standardizing on fewer types and sizes of fasteners
7. Save purchasing time by buying larger quantities from one supplier's complete line
8. Contribute to sales value of final product by using fasteners with a reputation for dependability and finish

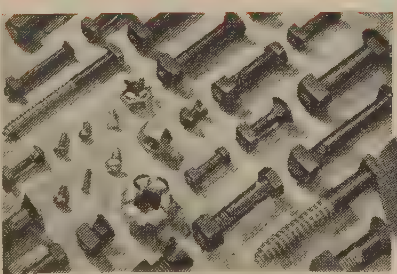
RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

102 years making strong the things that make America strong

RB&W bolts, nuts, screws, rivets and allied fastening products are manufactured in a broad range of styles, sizes and finishes.

• • •

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Chattanooga, Portland, Seattle. Distributors from coast to coast. By ordering through your distributor, you can get prompt service from his stocks for your normal needs. Also—the industry's most complete, easiest-to-use catalog.



R B & W
THE COMPLETE
QUALITY LINE

these transactions through other sources.

SALT LAKE CITY—Iron hungry foundries on the Pacific Coast can expect some improvement in the supply of merchant iron from U. S. Steel's Geneva plant.

A moderate increase in coal supply last week enabled the company to put back into production the No. 2 blast furnace, which has been down for some time because of short coal supplies.

"It is hoped," said Dr. Walther Mathesius, president of Geneva Steel Co., "that renewal of production in this furnace will supply the Geneva plant's own needs and increase the supply of merchant iron needed by iron foundries throughout the 11 western states."

All four of the company's blast furnaces—three at Geneva and one at Ironton—are now in regular production.

* * *

Construction by Standard Oil Co. of California during the next year of a $5 million pipe line from the Rangley oil field to Salt Lake City and the first unit of a new oil refinery in North Salt Lake will bring three major refiners into this area.

Control of the Wasatch Oil and Idaho Refining companies, which operate plants here and in Pocatello, Ida., was recently acquired by Phillips Petroleum Co. and expansions are under way at both properties.

Utah Oil Refining Co., subsidiary of Midwest which is a subsidiary of Standard of Indiana, substantially expanded its facilities through acquisition of the high octane plant built here by the government during the war.

First unit of Standard of California's plant will cost approximately $5 million and will have a capacity of about 25,000 barrels of crude per day. The company plans to get both the pipe line and the refinery into operation within a year but the exact timetable will depend upon availability of steel.

The new refinery will be constructed by the Bechtel Corp. of San Francisco.

SEATTLE—Whether union officials who have led unsuccessful fights for wage increases can retain their leadership will be put to a test here within the next few weeks.

Both labor and industry are watching the outcome of elections to be held this week when the Automotive Machinists union, Local No. 289, holds its election and the Aeronautical Mechanics union, IAM, Local 751, completes its nomination of officers and holds its election.

The automotive machinists have been out on strike for almost five months seeking $1.75 per hour, or a 25¢ increase. To date the automobile dealers and garage owners have offered the machinists $1.70 which has been refused by the union.

The elections this week may not determine the actual winners as it is necessary for each officer to receive a majority of votes, and, where a large number of candidates are competing, the initial vote may be split too many ways.

There is general dissatisfaction among the aeronautical mechanics about the manner in which their present officers conducted negotiations with Boeing Aircraft Co. when they were seeking higher pay a few months ago. The contract was supposed to have been renewed last March and negotiations had been under way for at least two months before that time. A stipulation of the contract was that it would continue in effect until a new agreement was reached by negotiation or arbitration and that there would be no walkout or lockout.

Finally, dissatisfied with Boeing's offer of 5¢ an hour plus six paid holidays, and shying away from the company's demand for "lateral transfer of employees," the union members voted to strike. However, their request for strike sanction was never granted and in August the union hastily renewed the old contract to get in under the wire before the Taft-Hartley Labor Bill became effective.

While many members of the union openly expressed a desire to be rid of the present officers, most of them are of the opinion that it will be a difficult procedure. Present officers, headed by Harold Gibson, president, are well entrenched while the opposition shows a lack of leadership. Some members of the opposition openly state that it is impossible to nominate a candidate because of present machinery set up for placing candidates in nomination.

FURTHER evidence of a tightening in the power supply situation in the Northwest is the request made by Puget Sound Power & Light Co. in asking industrial users and holders of limited contracts to curtail their use of electricity during the peak hours from 4 p. m. until 7 p. m. It is reported that by Nov. 12 the company had been carrying a peak of 513,510 kw which is 28,000 kw above the previous peak of 1947. It is believed that a new high will be reached before the end of the year.

At present, the western division of the Pacific Northwest power pool is receiving between 90,000 and 100,000 kw from eastern division sources, in Montana and Utah where demand has not been as great as was expected.

According to L. E. Karrer, vice president of Puget Sound Power, the company is only able to meet its present demands because it is using all possible steam generating plants. Karrer states that the amount of power that the eastern division can give the western division is limited by the capacity of the intertie line between the Montana Power Co. and Washington Water Power. He goes on to say that the big worry of all power groups during the next few months will be the possibility of a breakdown of an important generating or transmitting unit.

Engineering Exposition

St. Paul

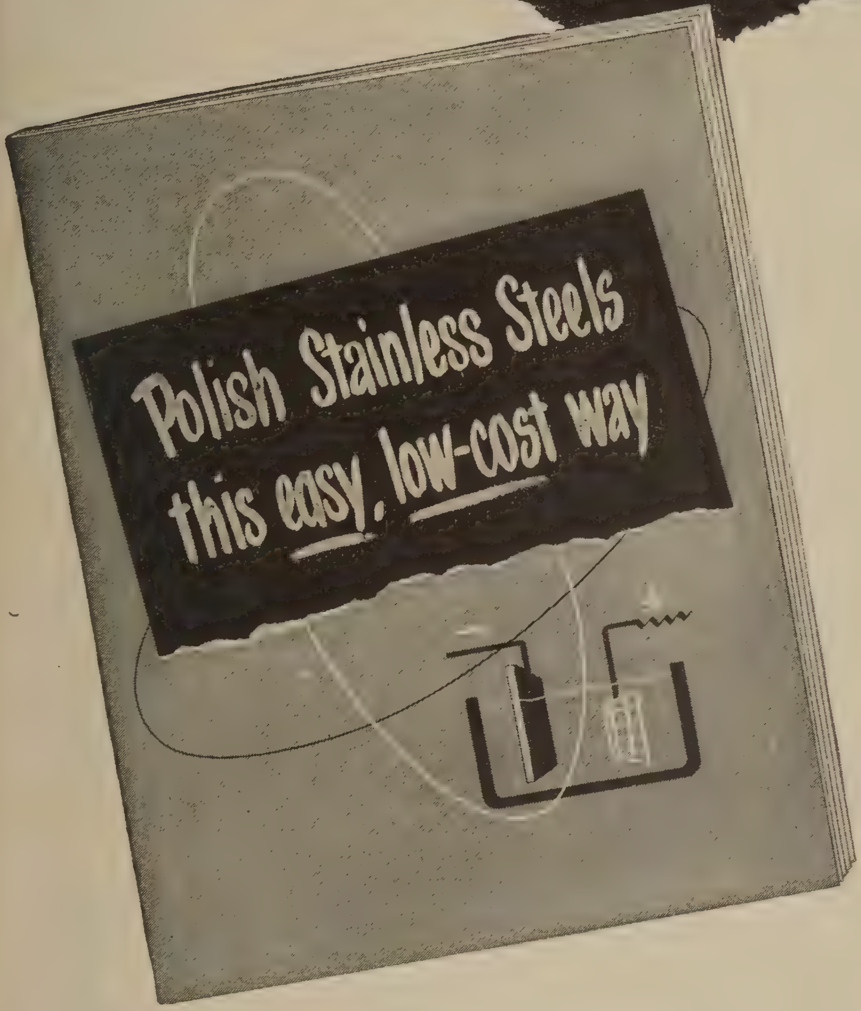
• • • **The 15 members** of the Minnesota Federation of Engineering Societies will stage their twenty-sixth annual engineering convention and third annual engineering exposition Feb. 11 to 14 in St. Paul.

Luncheons, business sessions, symposiums, technical discussions, and talks by state and national figures have been booked for the convention, while exhibitors already are preparing hundreds of the latest products and devices for exhibition in the municipal auditorium.

The exposition, open to the public, is expected to draw 100,000 spectators.

Katherine A. Feucht, 1000 Guardian Bldg., St. Paul, is federation secretary.

EVERY PRODUCT-FINISHER SHOULD HAVE THESE MONEY-MAKING FACTS



WITH ARMCO ELECTROPOLISHING . . .
You can polish many kinds of stainless steel products to a high luster *in one operation*—without turning a buffing wheel!

WHAT IT IS . . .
This improved process is called "Armco Electropolishing." It is an easy, low-cost method of polishing many stainless steel products by anodic treatment in an electrolytic bath. The process has shown substantial savings for fabricators of practically all forms of ARMCO Stainless Steel . . . wire, bars, forgings, sheets and strip.

IF YOU PLATE . . .
If your products are made of plated metals it may pay you to investigate the possibilities of ARMCO Stainless Steels — and the Electropolishing process. Many manufacturers have cut costs and made good products better by changing over to Electropolished stainless steel parts.

MAIL THE COUPON TODAY . . .
For more information about this cost-saving method of polishing stainless steels, just fill in the handy coupon on this page. We'll send you a fact-filled folder on Armco Electropolishing titled "Polish Stainless Steels This Easy, Low-Cost Way." Mail it today! The American Rolling Mill Company, 333 Curtis St., Middletown, O.

ARMCO ELECTROPOLISHING PROCESS

ARMCO

MAIL THIS TODAY!

THE AMERICAN ROLLING MILL CO., 333 CURTIS ST., MIDDLETOWN, OHIO

Send me a copy of the folder "Polish Stainless Steels This Easy, Low-Cost Way."

Name ______________________ Title ______

Company ______________________

Street Address ______________________

City ______________ Zone No. ______ State ______

PERSONALS

• **N. George Belury** has been appointed vice-president of the engineered castings division of the American Brake Shoe Co., New York, and **Harry C. Platt** has been named works manager. Mr. Belury, formerly sales manager, has served in various sales capacities since he joined the Brake Shoe Co. in 1937 after completing his studies at Purdue University. Mr. Platt, formerly division metallurgist, has been with Brake Shoe's metallurgical department since 1942. Both men will continue to be located at the division headquarters in Rochester, N. Y.

• **John G. Patterson II** has been appointed assistant to the president and **Hugh C. Farrell,** supervisor of industrial relations of Pittsburgh Limestone Corp., Pittsburgh, U. S. Steel subsidiary. Mr. Patterson, who became secretary and general attorney for Pittsburgh Limestone in 1946, will continue those responsibilities. In his new position as assistant to president he becomes head of the industrial relations department. Before joining the company in 1946 he was assistant secretary of Carnegie-Illinois Steel Corp., also a U. S. Steel subsidiary. Mr. Farrell first became associated with U. S. Steel in 1942 as statistician for Michigan Limestone & Chemical Co., later assuming the responsibilities of the industrial relations department of the company.

• **Warren B. Miles,** who has been manager of the Philadelphia warehouse of the Wheeling Corrugating Co., Wheeling, W. Va., for 30 years, will retire, effective the end of the year. **David L. Kendrigan,** who has been manager of the Boston warehouse, will succeed Mr. Miles at Philadelphia, while **F. S. Neal,** manager, Wheeling sales division, will assume Mr. Kendrigan's duties at Boston. At Wheeling, **Henry T. Stewart** has been promoted to the position of Wheeling sales division manager, succeeding F. S. Neal.

• **Stuart W. Cragin** has been elected a member of the board of directors of General Steel Castings Corp., Eddystone, Pa., to take the place of **Charles D. Dickey,** who has resigned. Mr. Cragin is vice-president of J. P. Morgan & Co., Inc.

° ° °

• **Randolph H. Hoy,** for the past 19 years sales manager of the Pittsburgh territory of Universal Atlas Cement Co., subsidiary of U. S. Steel Corp., has retired after 40 years of continuous service in the same territory with the company. **Fred L. Wagner,** who has been assistant sales manager in the Pittsburgh territory for the past 5 months, has been appointed to succeed Mr. Hoy.

ARTHUR G. LAMBERT, vice-president and manager export division, Atlas Steels Ltd.

• **Arthur G. Lambert** has been elected vice-president and manager, export division, of Atlas Steels, Ltd., Welland, Canada. Mr. Lambert has been associated with the steel business since 1919, in various production, metallurgical, sales and executive capacities, in England, United States and Canada. Prior to joining Atlas in 1940 as export manager, he was with the Canadian division of the Jessop Steel Co.

• **Kenneth J. Flood** has been named factory manager of Kaiser-Frazer Detroit Engine Div. Mr. Flood was formerly assistant factory manager at Willow Run, Mich. He succeeds **A. C. Breitenbeck,** who has resigned. During the war Mr. Flood was general superintendent of a Kaiser shipyard at Richmond, Calif.

• **R. F. Holtz** has been appointed assistant to J. W. Hoover, general traffic manager of U. S. Steel Corp.'s American Bridge Co., Carnegie-Illinois Steel Corp., H. C. Frick Coke Co., National Tube Co. and U. S. Coal & Coke Co. Mr. Holtz, who formerly held the position of assistant to the traffic manager, Pittsburgh district, has been affiliated with subsidiaries of U. S. Steel Corp. for 41 years in traffic and transportation work.

• **Ralph I. Peterson** has been named San Francisco representative for U. S. Steel Supply Co., steel warehousing subsidiary of U. S. Steel Corp. Mr. Peterson was until recently a member of the Supply Co.'s Chicago district sales office.

• **H. A. Pratt** has been appointed parts and service manager of the Davey Compressor Co., Kent, Ohio. A veteran of over 20 years of company service, Mr. Pratt was formerly superintendent of the Kent plant.

• **Gerald Wilson** has been appointed district contract manager for the eastern district by H. K. Ferguson Co. of Cleveland, New York and Houston. Mr. Wilson has been engaged in industrial engineering and construction activities for more than 20 years, and has been new business representative for Ford, Bacon & Davis of New York since 1939.

• **Joseph A. White,** formerly general superintendent of the Columbia Steel Co. at Pittsburg, Calif., has been appointed works manager of the Chicago plant of Ingersoll Steel Div., Borg-Warner Corp. **Milo F. McCammon,** who has been assistant works manager of the Kalamazoo, Mich., plant for the last year, has been made works manager there. **Robert S. Ingersoll,** who served as works manager for both plants for the last 2 years, will now devote his full time to his duties as vice-president of the Ingersoll Steel Div. in charge of manufacturing at the Chicago, Kalamazoo and Evansville, Ind., plants.

• **Lloyd A. Harris,** diesel engine specialist of the National Supply Co., has been transferred from the company's superior engine division, Springfield, Ohio, to the plant products division with headquarters in Houston.

FREDERICK P. AUSTIN, JR., treasurer and vice-president, Brown & Sharpe Mfg. Co.

• **Henry D. Sharpe** has resigned as treasurer of the Brown & Sharpe Mfg. Co., Providence, an office he has held since 1904. He will continue as president of the company. **Frederick P. Austin, Jr.,** assistant treasurer since 1941, has been elected treasurer and was made a vice-president of the firm. **Howard L. Merrill** has been elected an assistant secretary, succeeding the late Cecil W. Machon.

• **B. B. Kimball** has been appointed advertising manager of Pontiac Motor Div. of General Motors Corp., Pontiac, Mich. He has been employed at Pontiac for 30 years, the majority of the time being spent in the division's advertising department. He succeeds **P. R. Warmee,** who has resigned to become a Pontiac dealer at Van Nuys, Calif.

• **Norman L. Deuble** has joined the metallurgical engineering staff of the Climax Molybdenum Co., New York. For the last 4 years he has been with the M. W. Kellogg Co., Jersey City, N. J., in charge of special processes, and of the work in the high temperature laboratory. Mr. Deuble spent 2 years in the steel and the aircraft production divisions of the WPB and some time before that as sales manager of the Copperweld Steel Co. Prior to that time he was active for 20 years in alloy steel metallurgy with the Republic Steel Corp. and its predecessor, the United Alloy Steel Corp.

• **Thomas R. Walker,** general superintendent of pipe plants of the Warren Foundry & Pipe Corp., New York, has been elected vice-president, succeeding the late J. H. Morrison. **John F. Benjamin** has been elected general sales manager of the company.

• **Charles Pendock,** president and founder of the Le Roi Co., Milwaukee, has resigned and will assume the new position of chairman of the board of directors. **E. A. Longenecker,** former president of the Lauson division of Hart-Carter Co., has been named president of Le Roi to succeed Mr. Pendock.

• **Harry E. Orr,** formerly general manager of operations of the Vanadium Corp. of America, has been appointed assistant vice-president and manager of district sales of the corporation. He will be in direct charge of the Chicago sales district, with headquarters in Chicago, in addition to supervising other sales districts of the corporation. **D. G. Bowser,** formerly metallurgical assistant to the executive vice-president, succeeds Mr. Orr as general manager of operations, and will be located at Niagara Falls, N. Y.

• **Alton A. Way** has been appointed manager of the Tonawanda, N. Y., plant of the Chevrolet Motor Div. of General Motors Corp., succeeding **Alfred G. Gulliver,** retired. Mr. Way was general superintendent of the plant under Mr. Gulliver.

• **Lewis E. Sanderson,** superintendent of construction, has been named vice-president in charge of operations of the National Gypsum Co., Buffalo, succeeding **Gordon H. Tarbell,** retired; **Dean H. Crandell,** vice-president in charge of research, has been promoted to vice-president in charge of sales and advertising; **Charles E. Masters,** controller, has been made vice-president in charge of accounts, a new position, and **Frank L. Marsh** has been made director of research. An administrative planning department has been created and will be headed by **William T. Davidson,** who has been with the company since 1935.

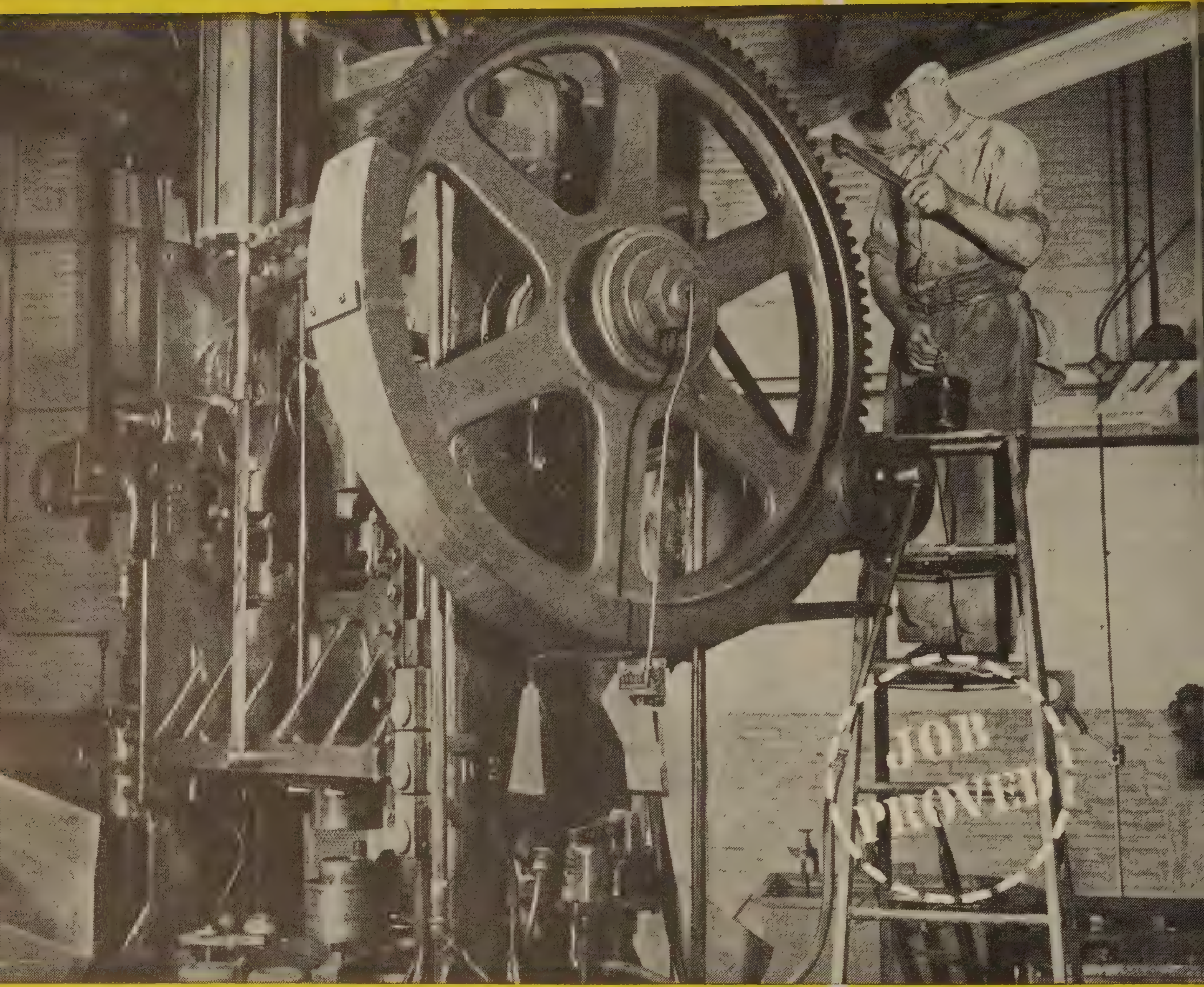
ROY E. MURPHY, vice-president in charge of sales, I-T-E Circuit Breaker Co.

• **Roy E. Murphy** has been elected vice-president in charge of sales of the I-T-E Circuit Breaker Co., Philadelphia. He will be in charge of I-T-E sales programs, and coordinating the combined selling of I-T-E and its subsidiary, the Railway & Industrial Engineering Co., Greensburg, Pa. Mr. Murphy has been associated with the I-T-E company since 1934 as sales manager and member of the board of directors.

• **Frank L. Estep,** electrical and mechanical engineer who has been active in the steel industry since 1900, has become associated with the Barium Steel Corp., Canton, Ohio. Mr. Estep will supervise and advise on activities of the 16 subsidiaries of the Barium Steel Corp. He has been associated with such companies as the Cambria Steel Co. and the Tennessee Coal, Iron & Ry. Co. in this country as well as the Nova Scotia Steel & Coal Co. of New Glasgow and other organizations in Europe, Mexico and India.

• **Andrew Van Echo** has been appointed metallurgical engineer, Wm. E. Pratt Mfg. Co., Joliet, Ill. Mr. Van Echo was formerly technical service representative and chief inspector for Joslyn Stainless Steel Co., Fort Wayne, Ind. Previously Mr. Van Echo had been employed in the metallurgical department of the South works of Carnegie-Illinois Steel Corp.

Bringing Down High Maintenance Costs



SUN LUBRICANT...

Puts an End to Frequent Bearing Failures and Shut-Downs, Eliminates 75% of Time Formerly Spent on Lubrication

A nationally known manufacturer who uses punch and forming presses was formerly handicapped by frequent bearing failures.

High maintenance costs and mechanical failures, due to lubrication, ended after a Sun Engineer recommended a Sun adhesive pressure grease that had been "Job-Proved" on heavy work in hundreds of plants. This tacky, fibrous grease is used on both gears and bearings, and lubrication time has been cut 75%.

This is just one of the scores of special "Job-Proved" products with which Sun Engineers are helping factories, mills, mines and other industrial plants to cut costs, speed up operations, or improve quality. For lubricants for all types of machinery . . . for Diesel, compressor or turbine oils . . . for hydraulic oils . . . for cutting oils, spirits or other petroleum products . . . call the nearest Sun office today.

SUN OIL COMPANY · ***Philadelphia 3, Pa.***

In Canada: Sun Oil Company, Ltd.—Toronto and Montreal

SUN

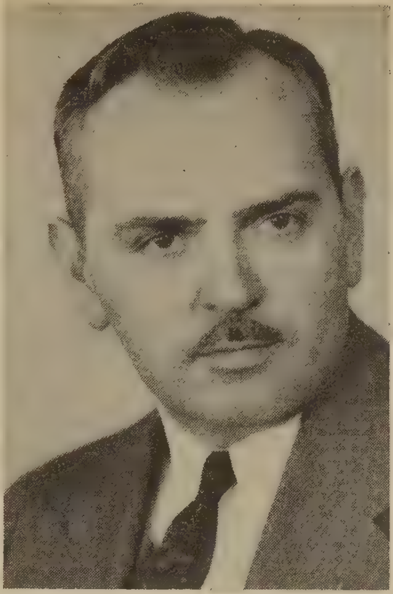
SUNOCO

INDUSTRIAL

PRODUCTS

- **Columbus Basile** has been appointed superintendent of Link-Belt Co.'s Caldwell plant at Chicago. Mr. Basile entered the employ of the Link-Belt Pershing Road Chicago plant in 1928. For the last 3 years he has been in charge of time study and methods at the plant in Philadelphia. **Leonard C. Heinlein** has been appointed to the newly-created position of assistant superintendent at the company's ball and roller bearing division plant in Indianapolis. He started with this plant in 1926 and began work in the engineering department of the antifriction bearing division in 1939.

- **Arthur P. Hall** has been named assistant director of public relations and advertising for Aluminum Co. of America, Pittsburgh. He has been district sales manager for Alcoa's Washington offices for the past 4 years, and will be succeeded in that position by **R. A. Learnard,** assistant district sales manager in Washington. Mr. Hall came with Alcoa in 1929, became resident manager of the company's New Orleans office in 1932, and was transferred to Washington in 1939. In 1943 he was made manager of the Washington district office, and was named an assistant secretary of the company the same year.



JERRY M. GRUITCH, director of research and development, American Car & Foundry Co.

- **Jerry M. Gruitch** has been appointed director of research and development, American Car & Foundry Co., New York. Mr. Gruitch had been assistant chief engineer at the Dodge Div., Chrysler Corp., and later vice-president in charge of engineering and a member of the board of directors, O. A. Sutton Corp., prior to joining American Car & Foundry.

- **Eugene B. Mapel** has been appointed supervisor of education and training of Carnegie-Illinois Steel Corp., Pittsburgh. First employed by this U. S. Steel subsidiary in 1936, Mr. Mapel formerly served as supervisor of administration planning, prior to which he held the position of manager of sales personnel and served in various capacities in industrial relations work both in Pittsburgh and in Gary, where he was employed at Carnegie-Illinois sheet and tin mill as director of training immediately preceding his transfer to Pittsburgh in 1940.

- **H. H. Blohm** will head the motor statistical department of R. L. Polk & Co., Detroit, succeeding **C. G. Thornburgh,** retired. Mr. Blohm has been associated with R. L. Polk & Co. since 1923.

- **Carlton M. Higbie** has been elected president of McAleer Mfg. Co., Detroit, succeeding N. Bradley Higbie. **Bert Ward** has been elected vice-president of the firm, and **Norman Eliot,** treasurer and assistant secretary.

- **Emmet F. Harding** has been appointed general sales manager of Corbin Screw Div., the American Hardware Corp., New Britain, Conn., succeeding **Elliott C. Paddock,** who has resigned. Mr. Harding was assistant general sales manager before being advanced to his present position.

...OBITUARY...

- **George F. Wiepert,** 91, vice-president and director of Sargent & Co., New Haven, Conn., died Nov. 24. He was associated with the company since 1884.

- **Harold B. Gaylord,** 67, Philadelphia sales manager for the Carpenter Steel Co. died Nov. 26. Mr. Gaylord had been associated with Carpenter in the Philadelphia branch for more than 30 years.

- **Henry G. Rixinger,** 57, purchasing agent of the Erie Electric Co. of Buffalo, died Nov. 26.

- **Robert B. Lewis,** 73, chief engineer of the Tinius Olsen Testing Machine Co., Philadelphia, for 35 years, died recently.

- **Walter G. Sargent,** structural engineer with the Gilbert Small & Co., Boston, before he retired in 1946, died Nov. 24.

- **Floyd O. Tanner,** 64, a former General Motors Corp. vice-president in Detroit, died recently. Mr. Tanner joined Hudson in 1911 and became plant manager of Chevrolet Gear & Axle in 1922 and a vice-president of GM in 1937.

- **Francis H. Fenn,** president of the American Bantam Car Co., Butler, Pa., died recently.

- **Alfred J. Marchev,** 51, president of the Aircraft Screw Products Co., Inc., of Long Island City, died Nov. 28. Mr. Marchev had been president of the Republic Aviation Corp. during the war. He retired in May as chairman of the board of Republic to become president of the Aircraft Screw Products Co.

- **Daniel J. Sullivan,** 54, chief tool engineer of National Twist Drill Co., Rochester, Mich., died recently.

- **O. M. Polk,** chairman of the board, the Sheffield Corp., Dayton, died Nov. 22.

- **Ray D. Love,** president and general manager of the Betz-Pierce Co., Cleveland, died Nov. 17.

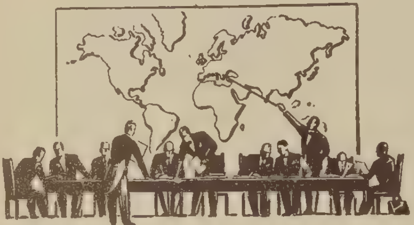
- **Richard Wastcoat,** president and treasurer of the Paragon Gear Works, Taunton, Mass., died recently.

- **Bernard C. Parker,** 59, New England manager of Atlas Diesel Engine Corp., died Nov. 25.

- **Cummings C. Chesney,** 84, retired vice-president and works manager of the Pittsfield, Mass., works, General Electric Co., died Nov. 27.

European Letter . . .

• American aid to Greece to last until June 1948 . . . Much of it is being drained off into the civil war . . . Inflation is one of the most serious difficulties to face in Greece.



LONDON—Civil war in Greece today overshadows every aspect of the people's life and the country's economy. In Athens, the words civil war are not used; it is referred to euphemistically as the troubles, the disturbances, the problem of restoring order. This ju-ju has not been effective, for by whatever name you call it, the problem remains—grave, unsolved and a drain upon the resources of the country.

Greek rebels are fighting throughout the mainland down to the northern coast of the gulf of Corinth, and, to a smaller extent, both in the interior of the Peloponnese, and in certain parts of the island of Crete.

The highest figure given for their numbers is 15,000 to 20,000. The Greek army and militia number 150,000 with an additional 50,000 government defense forces or national guards. But rebel activity remains unchecked; more and more of the wealth of the country, and of the aid that is going into Greece, is being drained off into the civil war.

It is reliably estimated that since the war, and up to the spring of 1947—that is before the present American Mission for Aid to Greece started its work—$1 billion worth of supplies had been put into Greece by Anglo-American aid and UNRRA. Yet Greek economic conditions have improved little and very little progress indeed has been made in reconstruction.

Before the Americans took over, the Greek budget deficit was estimated at $290 million, which represented about three times the amount of currency in circulation at that time. The cost of the army in this estimate was $180 million (as against $40 million before the war).

Against this background the American Mission started its work this summer. It arrived in Greece to give help and to advise the government on the best way to make use of the $350 million which Congress had voted for 1 year only. The work of the Mission is planned to finish by the end of June 1948.

Of the $350 million, $150 million has been earmarked for expenditure on military and defense purposes, $80 million on reconstruction, $50 million on food, $20 million for agricultural purposes and livestock, and $50 million for the stabilization of the Greek currency. But some alterations in this program have already been made, and President Truman reported to Congress on Nov. 10 that already funds assigned to reconstruction have had to be transferred to the military program.

THE American staff for their gigantic task is small—in the civilian branch 140 including secretaries, and a total of 81 officers and men in the military and naval branch; but many other people, including employees of U. S. contracting firms as well as military engineers, are also taking part.

Reprinted from The London Economist by special permission.—Ed.

There is a feeling that time is short, and work must get under way if it is to be anything like finished by June next year.

Contracts to a total value of $82,400,000 have already been placed with American engineering firms for work to be done on Greek railways, roads, bridges and ports. The total has been divided up into $64 million on railways, highways and bridges; $17½ million on repairs to the ports of Piraeus, Salonika and Volos and clearing the Corinth canal; and $900,000 for steel for the repair of 14 bridges.

The contracts have been given on a cost-plus basis, and the total for each item has been divided into the amount that will be spent in dollars in the United States, and the amount to be expended in drachmae in Greece. For instance, the amount to be spent on the repair of roads and highways is divided into $10,300,000 for dollar expenditure, and $38,700,000 for local expenditure in drachmae.

The American ships bringing supplies into the Piraeus ever since August are a sign that, on the military side, the Americans mean business. Fifty-three million dollars worth of military supplies have already arrived from the U.S.A. There has also been a steady delivery of food, for both the military and civilian population; in July they received $9 million worth, in August $17½ million, and in September $14½ million.

The Americans are also helping with Greek export problems. A program has been drawn up for the year ending June 30, 1948. It estimates Greek exports for this year at a total of $93,760,000, of which the main categories are as follows: Tobacco, $40,000,000; currants, $18,200,000; sultanas, $10,560,000; olives, $4,000,000; hides, $3,000,000; and minerals, $3,000,000.

Steps are already being taken to carry out this program by trade treaties with many European countries. In some cases agreement has already been reached, in others it is still under discussion. Before the war, most of Greece's trade (about $200 million) was with Germany, so that now Greece has had to look elsewhere for markets for her exports. Trade agreements have been, or are being made with Great Britain, Italy ($12 million), Switzerland ($4,-

500,000), Sweden, the Anglo-U.S. zones of Germany, and Czechoslovakia.

THE figures represent the most optimistic view of Greek export possibilities. It is by no means certain that all available surpluses will reach the export market, but a foreign trade administration has been established as part of the Ministry of National Economy, and an American has recently been appointed as its chairman. He is to help in the administration of the new scheme of foreign exchange certificates, which has been launched to help Greek exporters and act as a check on imports.

Under this scheme exporters selling foreign exchange at the banks receive in addition to the drachma value a certificate for the equivalent sum in foreign exchange. Importers, when applying for an import license, must produce a certificate for the amount of foreign exchange they wish to buy. These certificates are negotiable on the Stock Exchange and the temporary exchange rate for the certificates has been fixed at 5000 drachmae to the pound sterling and 3000 drachmae to the dollar. The system subsidizes the exporters at the expense of the importers, who have for some time past been making notoriously high profits because internal prices in Greece are much higher than world market prices.

At the best of times only 20 pct of Greece is suitable for grain cultivation, and the civil war is steadily reducing the crop-growing area. Immediately before the war Greece's normal wheat harvest produced about 900,000 tons towards the annual consumption of 1,600,000 tons. This year the harvest is only 450,000 tons.

Greece has asked the International Emergency Food Council for an allocation of 700,000 tons of bread grains. The danger is not that the government supporters in Greece will starve this winter—for it seems certain that American food will continue to go in—but that this decline in grain production will become a permanent factor in the Greek economy.

In tackling all these problems, one of the most serious difficulties the Americans face is inflation. Prices have risen a lot since the arrival of American aid this summer. The official price of food is 150 times that of 1938, of clothing 229 times, and the general average 158 times. These estimates were made several months ago, and are already well outstripped by further rises in prices.

Free and black market prices are, of course, higher still, and are more representative of prices actually paid. It was thought that the arrival of the American Mission might bring about a solution of the wages problem; but no agreement has yet been reached, and there is still imminent danger of a strike of government employees, who, until the cuts now being carried out, constituted 20 pct of all employed people in Greece.

Gold continues to be used—though illegally—for all major transactions whether commercial or merely the payment of a tailor's bill. Prices are quoted in gold sovereigns and paid for in drachmae against the gold quotation for the day of payment. The value of the gold sovereign has risen to 193,000 drachmae as against the 20,000 drachmae paid for £1 on a traveler's check.

All those who can are busy changing available possessions into gold. It is rumored that there are 10 million illegal gold sovereigns in Greece today, with 20,000 changing hands each day. If this seems a large figure, it is not an impossible one, for gold was literally showered into Greece during the war to finance underground operations against the Germans, and this only added to the gold that was already in circulation in Greece before the war.

An American was heard recently to complain, "But if we have sufficient confidence in the country to put $350 million into it, why don't the Greeks have enough belief in themselves to stop using gold?"

The reply of the ordinary Greek is made in the light of past history and future expectations; seen against present needs the sum of $350 million looks like the one swallow that does not make a summer. Thus most Greeks are thinking along lines of long-term insecurity.

There is no end in sight to the civil war. Already $9 million of the American aid program has been transferred from civilian to military aid. Even the end of the civil war would not of itself mean the end to inflation. There will be aid from the U. S. for 1 year; American influence on policy and planning, if not on politics until June 1948, . . . and then what?

BIGGEST SINCE WAR: *The* 31,000-*ton liner "Orcades," built by Vickers-Armstrong for the Orient line at their Barrow-in-Furness yards, is the biggest merchant ship to be launched since the war. Built for the Australian trade at a cost of* $12 *million, the ship will carry* 1500 *passengers and a crew of* 608.

Industrial News Summary...

- ***Steel Firms Fight Gray Market***
- ***Tinplate Prices Upped Sharply***
- ***Scrap Movement Still Sluggish***

QUIETLY but forcibly, major steel companies have been striking out in an effort to wreck the black market steel racket. Dozens of customers have been thrown off mill order books for gray market activity. With few exceptions the war against misuse of steel producers' material by some of their customers has been an undercover proposition—it has to be to trap those who are diverting steel.

One major steel firm has sent a letter to all of its customers soliciting information in any case where the customer has been offered that steel company's material at gray market prices. The firm's vice-president and general counsel has been given the specific job of tracking down any gray market steel involving his company's products.

A few other major steel companies have been continuously attempting to eliminate any chance of their products winding up in the gray market. At best, this is a difficult job because of the great number of customers and the alacrity and experience of some steel consumers in obtaining more steel than they need and selling the surplus at premium prices.

No system of government allocation or control would have any effect on the steel gray market which involves between 4 and 5 pct of the total steel being shipped. Nor can the activities of steel companies which are desperately trying to protect their names by searching out gray market dodgers make much dent in such transactions as long as demand continues far above available supply.

Customers' swaps of steel they no longer need for another grade they require will always throw some steel into high priced channels. Second grade rejected steel will continue to be offered as prime material by those other than steel producers, and other well-known dodges stand no chance of being eliminated for some time. The activity of steel producers is in answer to those who have claimed nothing was being done.

AS expected, tinplate producers have raised the price of tin mill products for the year 1948 (2 months ago The Iron Age estimated that the price advance would be between $15 and $25 a ton). Hot dipped tinplate carrying 1.25 lb of tin per 100 lb base box of tinplate has been advanced $17 a ton. Another grade of hot dipped material comprising a much smaller percentage of total tinplate shipped has been advanced $21 a ton. Electrolytic tinplate (thinner coatings than the hot dipped material) has been advanced $19 a ton. Canmaking quality black plate and special coated manufacturing ternes have been advanced $20 a ton. All of these increases will be effective Jan. 1, 1948.

Because tin mill products were not advanced last August, increased steelmaking costs on this product have been absorbed by steelmakers for the past 5 months. No advance could be made before Jan. 1 because of annual contracts between tinplate makers and canmakers. Tinplate producers still may be taking some chance because they have no idea of how much more steelmaking costs will advance during 1948.

IN contrast to many months ago when the automobile industry was castigating steel firms for lack of steel and shutting down plants for that reason, automobile output this week is going at full tilt, with the probability of winding up as a 5-million car year. When the last figures are in for 1947 it will probably show that the automobile industry got a greater percentage of available steel than any other group. Although total finished steel production this year will be 28.8 pct greater than a year ago, automobile makers as a group will receive about 38.7 pct more steel than they were shipped in 1946.

Probably a larger amount of steel has been going to the automobile industry this year than is indicated by official figures. Some gray market steel is being used in automobile production. In other cases, at least a few parts makers, who have been able to wangle more flat-rolled material than they need for their own production, have been helping out some automakers in order to cement future customer relationships.

THE scrap market this week appears serene on the surface but underneath has the possible makings of trouble later on. No major changes have occurred in scrap prices. The Iron Age steel scrap composite price this week was unchanged at $40.25 per gross ton. Most large consumers are staying out of the market in an attempt to make current lower quotations stick. What would happen if a few steel firms were to place substantial orders is what is worrying the trade this week. It is recalled that last October an upward rise in scrap prices occurred when several consumers suddenly jumped into the market for available material. There is no indication that there will be any discernible trend in scrap prices until at least after the first of the year.

In addition to scrap searching missions and committees a more potent weapon is to be used by the OIT of the Commerce Dept. in an effort to relieve the tight scrap situation here and abroad. This commission will attempt to uncover scrap in Europe for use there in an effort to eliminate the necessity for exporting scrap from this country under the Marshall Plan. The new and fresh venture will also attempt to expedite the flow of scrap back to this country where possible.

Steel ingot production this week is unchanged at the postwar peak level of 98 pct. It will probably stay at this level until Christmas week, when some decline will be noted because of the holidays.

• **STEEL PAYROLLS**—Total payrolls covering wage earners and salaried workers in the iron and steel industry proper for October 1947 established a monthly record at $180,090,000, according to the American Iron & Steel Institute. The previous record month was May 1947, at $175,793,000. The wage and salary payments during October brought the total for the first 10 months of this year to $1,639,832,000. The average hourly wage rate paid to steelworkers in October 1947 was $1.546, as compared with September's high mark of $1,571, and the October 1946 hourly rate of $1.341. The average work week for wage earners in October 1947 totaled 40.6 hr, as compared with 38.3 hr in September 1947, and 40.3 hr in October 1946. Total employment in the industry rose to 619,600 persons in October 1947, the highest monthly mark since August 1947. September 1947 employment amounted to 618,400, while the number employed in October 1946 totaled 595,700 workers. Of the October employment, 528,200 represented hourly, piecework and tonnage workers, with the balance comprising salaried employees.

• **CHESTER FURNACE OPERATION OUT**—In recent years, reactivation of the old Chester, Pa., blast furnace has been given consideration by a number of pig iron consumers. The most recent development was the possibility of a joint venture into its operation by Portsmouth Steel Co. and the Phoenix-Apollo Steel Co. It is understood that the project has now been abandoned due to the hopeless condition of the furnace and supplementary equipment.

• **KAISER ALUMINUM OFFICALS** have disclosed that the Permanente Metals Corp. is considering the addition of aluminum rod, bar, and wire making facilities at its Spokane rolling mill. A group of Permanente engineers visited Pittsburgh last week, where they met with manufacturers to discuss the availability of heavy machinery to produce rod, bar and wire.

• **FIRST AIRSHIP SCRAP**—Milwaukee's first venture into scrapping large vessels began when the Wolverine, former Seeandbee, converted aircraft carrier used for training at Great Lakes naval station, was towed from Chicago to Milwaukee's open municipal docks where the job of shipbreaking will be started by the A. F. Wagner Iron Works. Later the partially dismantled ship will be towed to the firm's yards at 1905 S. First St.

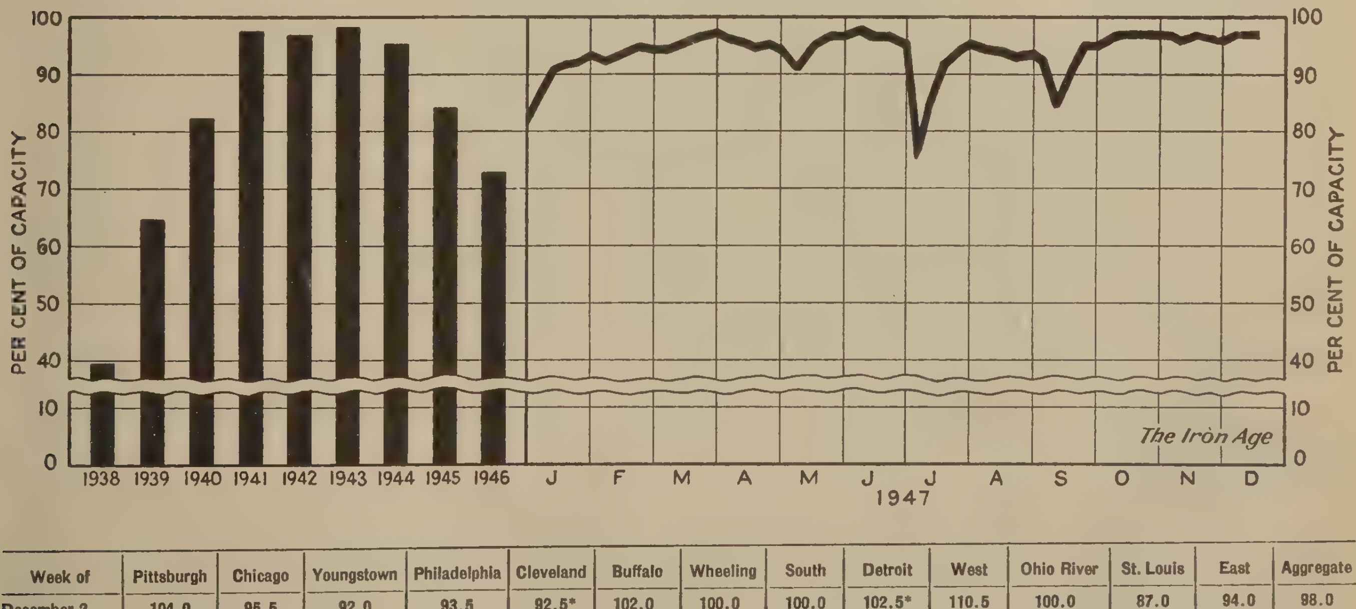
• **CARBUILDERS SUBPOENAED** — The subpoena handed the American Railway Car Institute is the government's third attempt at an antitrust indictment against the carbuilders. Two previous attempts to secure indictments were not carried through to completion. This latest, which required submission of almost every record kept by the carbuilders, is seen in some quarters as just another fishing expedition.

• **FTC APPOINTMENT**—Dr. Corwin D. Edwards, professor of economics at Northwestern University, has been appointed as chief economist and director of the Federal Trade Commission's Bureau of Industrial Economics. In addition to having served as chief of the price board of NRA, Dr. Edwards has served the government in various other capacities including a previous hitch with FTC as an economic adviser, with the Dept. of Justice as chief of the policy board of the anti-trust division, and with the State Dept. as consultant on cartels.

• **SLOWDOWN**—Since Nov. 4 the cranemen at the merchant mills of the Gary Works of Carnegie-Illinois Steel Corp. have been on a slowdown strike. The 120 cranemen involved want more money and so far they have not paid any attention to the union's and management's statements that higher wages will have to wait renegotiation of the present contract. Thirteen mills have been affected which since Nov. 4 have lost 15 pct of their daily production, which means about 900 net tons of finished sections each day.

• **CHILE COMMISSION**—A mission, headed by Gilbert H. Clee of the International Bank for Reconstruction and Development and including two independent engineers, has left Washington for Chile where it will conduct an economic and technical study in connection with a loan application by that nation. Chile's loan, should it be granted, will be used for financing hydroelectric developments, forest industries, railway electrification, transportation facilities, and port mechanization.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
December 2....	104.0	95.5	92.0	93.5	92.5*	102.0	100.0	100.0	102.5*	110.5	100.0	87.0	94.0	98.0
December 9....	104.0	96.0	92.5	93.5	95.5	102.0	100.0	102.0	101.0	110.0	100.0	98.0	98.0	98.0

* Revised.

REDUCE FOUNDRY COSTS BY THE USE OF MAGNAFLUX*

Present demands for castings are high, but defective castings add to costs for all concerned. Inspection with Magnaflux and Zyglo* in the foundry reduces cost for the greater number of good castings produced. Waste time spent on defective castings is eliminated and the cost of scrap and salvage operations markedly reduced.

Defective castings cause expensive rejection when defects are made obvious by final machining or assembly. Process control can eliminate defects when they are found early with Magnaflux.

It is easy to reduce costs and build confidence in your castings with Magnaflux equipment, correctly used to inspect in the best way at the best place in your plant.

MAGNAFLUX CORPORATION
5902 Northwest Highway, Chicago 31, Illinois
Chicago • New York • Detroit • Dallas • Los Angeles • Cleveland

---

**Magnaflux and Zyglo, Registered U.S. Patent Office, a trade-mark of Magnaflux Corporation applied to its equipment and materials for magnetic particle inspection.*

Auto Makers Owning Steel Plants Have Best Production Records

Producers Making Conversion Of Ingots and Slabs Into Sheet Also Fare Well

By W. G. PATTON
Detroit Regional Editor

Detroit

• • • **You don't have** to own a steel plant or arrange for conversion of ingots or slabs into sheets to produce automobiles but it helps if you do.

This is the conclusion of a prominent Detroit statistician who has just completed a study of new car registration. The data indicate that auto manufacturers who do not have their own steel facilities or conversion programs are losing ground to auto producers who have their own steel plants or have stressed the importance of obtaining steel by the conversion route.

According to the results of this study, auto producers like Ford and Kaiser-Frazer who have their own steel facilities have made a much better postwar production showing than General Motors, Chrysler and Packard, for example.

This point is demonstrated by a study of registrations of new passenger cars during the first eight months of 1947 and 1941 (Table 1). According to registration figures for this period, Hudson has made the best comparative showing of all passenger car companies. Hudson's 1947 registrations were 19 pct higher than the 1941 total. Lincoln has come out second best with 1947 registrations running 8 pct higher than the 1941 figures. (However, Ford registrations are only 67 pct of the 1941 total). Nash also registered 8 pct more passenger cars in 1947 than in 1941. Each of these producers is reported to be using a substantial tonnage of conversion steel.

Looking at the Big Three totals. Ford-Lincoln-Mercury registrations during the first eight months of 1947 are 72 pct of the 1941 total. Chrysler registrations aggregated approximately 60 pct over the 1941 total, and the General Motors percentage was 58.6 pct.

Among the Chrysler divisions, Dodge made the best showing with registrations totaling 77.5 pct of the 1941 total; DeSoto was in second place with 62.8 pct and Chrysler Div. made the poorest showing by registering only half as many cars in the first eight months of 1947 as were sold in the corresponding period of 1941.

Among the General Motors divisions, Cadillac was in first place with 70.4 pct, followed by Oldsmobile with 61.0 pct, Buick 59.4 pct, Chevrolet 57.3 pct and Pontiac 57.0 pct.

Among the independent auto producers, Willys registrations were 87 pct of the 1941 figure and Studebaker total was 75 pct of the 1941 figure. Packard is far down the list with only 59.5 pct of 1941 sales reported during the first eight months of 1947.

The truck picture is a much happier one so far as auto manufacturers are concerned. New truck registrations during the first eight months of 1947 were a booming 16 pct higher than the 1941 figure. Among the large truck producers, Dodge made the best showing, registering 96 pct more trucks in 1947 than were sold during the corresponding eight months of 1941. Ford's ratio of 1947 truck registrations compared with 1941 sales

"Everybody's Doing It"

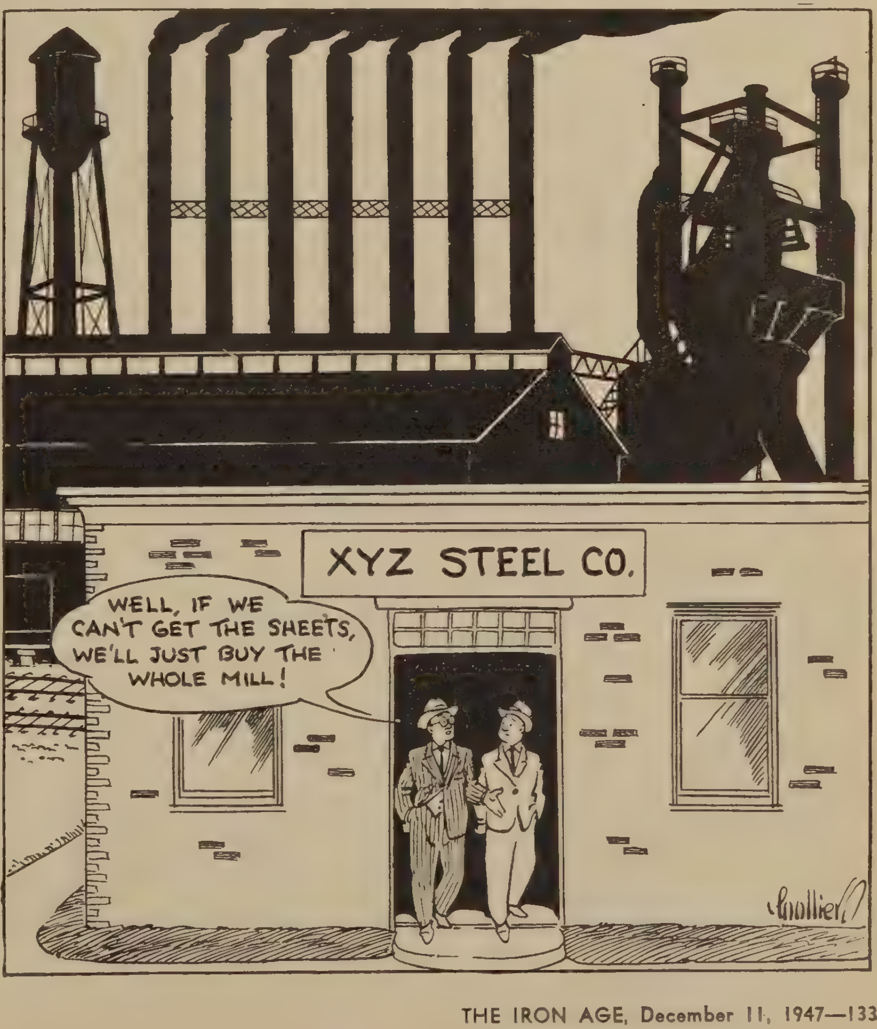

XYZ STEEL CO.
WELL, IF WE CAN'T GET THE SHEETS, WE'LL JUST BUY THE WHOLE MILL!
Collier

TABLE 1

Manufacturer	1941 Registrations (First 8 Months)	1947 Registrations (First 8 Months)	Ratio of 1947 Car Registrations to 1941 Registrations	Percentage of Total 1947 Registrations
Chrysler	120,326	60,918	50.6%	.....
DeSoto	74,495	46,761	62.8	.....
Dodge	174,065	134,943	77.5	.....
Plymouth	373,547	206,637	55.3	.....
	742,433	449,259	60.5	21.8%
Ford	500,922	337,201	67.3	.....
Lincoln	14,844	16,056	108.2	.....
Mercury	67,158	68,937	102.6	.....
	582,924	422,194	72.4	20.5
Buick	260,435	154,774	59.4	.....
Cadillac	49,473	34,808	70.4	.....
Chevrolet	748,913	429,421	57.3	.....
Oldsmobile	195,966	119,576	61.0	.....
Pontiac	239,549	136,786	57.0	.....
	1,494,336	875,365	58.6	42.4
Hudson	56,827	67,768	119.3	3.3
Nash	65,273	70,416	107.9	3.4
Packardy	49,314	29,341	59.5	1.4
Studebaker	89,679	67,221	75.0	3.2
Willys	17,877	15,623	87.4	.8
Kaiser-Frazer	....	55,042	.....	2.7
Crosley	....	10,171	.....	.5
Misc.	2,790	551	19.7	.....
Total 1947 Registrations	....	2,062,951	.....	100.0%

Source: Ward's Reports, Inc.

was 102.8 and the Chevrolet ratio was 86.3.

It is interesting to note that although their output is small, Studebaker and Reo sold eight times as many trucks during the first eight months of 1947 as were registered during the corresponding period of 1941. It is also interesting that more than two-thirds of all trucks registered during the period were sold by Ford, Chevrolet and Dodge, and that Ford had the largest numerical sales total.

TABLE 2

Manufacturer	1941 Truck Registrations (First 8 Months)	1947 Truck Registrations (First 8 Months)	Ratio of 1947 Truck Registrations to 1941 Truck Registrations	Percentage of Total 1947 Truck Registrations
Autocar	1,755	3,091	176.1%	.6
Brockway	1,573	2,885	183.4	.5
Chevrolet	159,452	137,534	86.3	25.3
Diamond T	4,368	6,849	156.8	1.3
Divco	1,690	3,061	181.1	.5
Dodge	44,313	87,043	196.4	16.0
Federal	1,067	3,818	357.8	.7
Ford	135,124	138,919	102.8	25.6
G.M.C.	32,018	33,164	103.6	6.1
International	68,026	74,624	109.7	13.7
Mack	6,612	6,938	104.9	1.3
Reo	1,040	9,021	867.4	1.7
Studebaker	3,393	27,632	814.4	5.1
White	6,608	8,682	131.4	1.6
Total	467,039	543,259	116.3	100.0%

Source: Ward's Reports, Inc.

Another way to indicate the reshuffling that is going on in the automobile industry during the current steel shortage is to compare actual production of cars by individual manufacturers with the demand for cars as disclosed by a survey recently conducted by a national publication. In this survey several thousand prospective car buyers were asked to give their preference as to which car they would buy if all makes were currently available. These results were then compared with actual registrations.

Based on the results of this survey automobile manufacturers who do not have their own steel facilities would have obtained 84 pct of the industry's business; actually these manufacturers produced 69 pct of the cars. Automobile manufacturers who purchased ingots and made the laborious and costly arrangements for rerolling got 2 pct of the customers' votes, but produced 7 pct of the passenger cars. Car manufacturers who own their own steel mills were first choice of 14 pct of the customers, but they actually produced 24 pct of the cars.

Automobile producers recognize, of course, that the net result of the steel conversion arrangements made by the automobile industry with the steel producers has been to bring into operation thousands of tons of electric furnace capacity that might otherwise be idle. Because these conversion arrangements have been made the auto industry has been able to produce many thousands of cars that would not otherwise have come off the assembly lines.

The results of this study seem to indicate that the car manufacturers who have spent time, effort and money to make necessary conversion arrangements with steel suppliers have been well rewarded for their efforts.

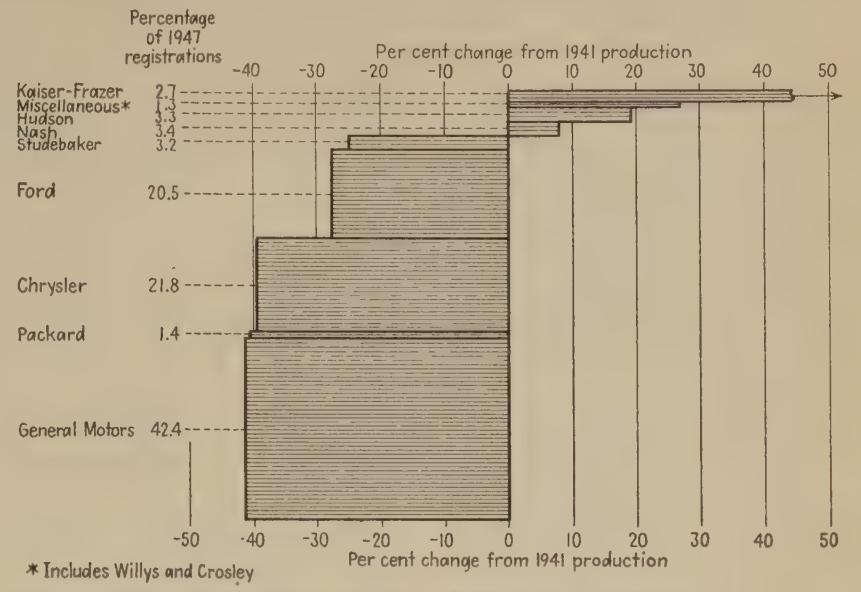
•

Empire Steel Being Sold to Studebaker; Price Is $7,430,000

New York

• • • **Sale** of the Empire Steel Corp. of Mansfield, Ohio, to the Studebaker Corp. has been arranged, pending the approval of

Auto manufacturers who own steel plants, or who have arranged for conversion of ingots by custom rollers, have had a more favorable production record than have those dependent on steel purchased from integrated steel producers.



* Includes Willys and Crosley

Empire stockholders. The price will be $7,430,000 for 348,000 net tons of ingot making capacity and 120,000 tons of hot-rolled sheet making capacity. Principal products of the firm at present are hot-rolled ternes and electrical sheets. It has also been selling ingots for conversion deals.

According to an announcement by H. F. Vance, chairman of Studebaker, the steel company will be operated as a subsidiary of Studebaker under Empire's present management. He stated that the acquisition would make it possible to step up Studebaker's production rate from the present 20,000 units monthly to around 25,000 units per month much earlier than had been anticipated.

The Studebaker official explained that his company does not expect to absorb Empire's entire steel production. He stated that the needs of the auto company are to be taken care of so as to cause the least possible disturbance to Empire's present customers. The number of new Studebaker registrations during the present year is down over 20 pct from 1941, according to figures released in Detroit this week (see p. 133), due primarily, it is believed, to the steel shortage in the auto plant and among its suppliers.

The effect of the Empire sale among the auto firms in Detroit will not be staggering, although some people will be considerably inconvenienced. Most of the Empire tonnage coming into the auto center was terne plate. Ford was a large consumer of Empire's production of this item, but General Motors, Briggs, and Murray are unaffected. Nash got about 50 tons of hot-rolled sheet from Empire per month up until November, but received none last month.

It is understood that for the immediate future Studebaker hopes to maintain its present steel sources, and to use Empire as a source for the steel it has been getting through conversion deals.

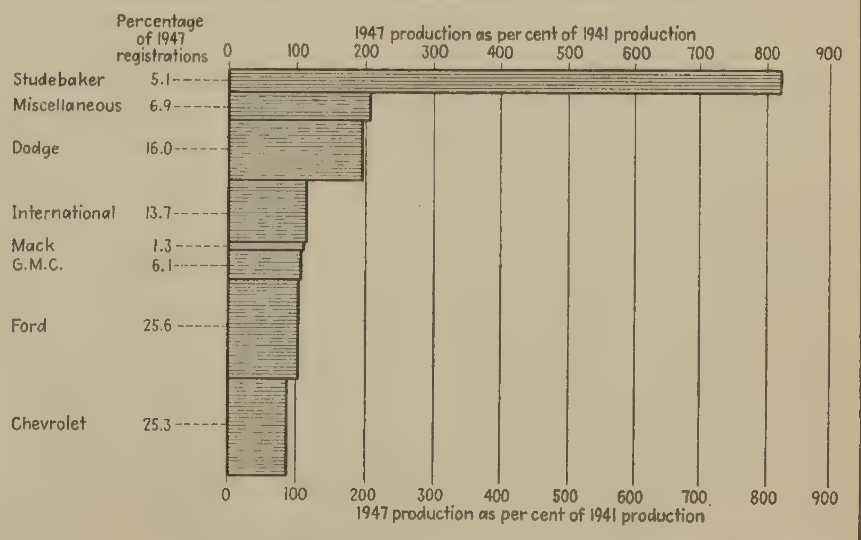
About 2 months ago, Empire notified all its customers that it was going out of the terne plate business on Jan. 1 (when the sale is to be consummated), and most old customers have already done what they can to cover themselves. Ford states that it has been partially successful, and production of cars will not be stopped, but they expect to be somewhat inconvenienced. However, it is understood that McCord Radiator is in a bad way for coated sheets and is yelling for help in January.

Ford and possibly others in Detroit have ingot deals with Empire and the fate of these arrangements is not known at present. However, a steel buyer for one of the auto firms has stated that he has assurances that all first quarter tonnages will be delivered.

Most consumers feel that the companies which have been buying black beauty and electrical sheets will be hardest hit by the Studebaker purchase. This would include both Westinghouse and General Electric—as these specialties were heavy tonnage items with Empire.

The sale to Studebaker continues the trend by automobile producers to take the steel shortage seriously. Ford and Kaiser-Frazer were already producing part of their own steel. The Empire facilities include two 95-ton openhearths, two 112-ton openhearths, and two 140-ton openhearths; a 32 in. blooming mill and a 24-in. sheet bar mill, and a number of finishing mills.

TRUCK OUTPUT: *The table indicating 1947 output of trucks shows what an important part they have played this year. Some experts predict that a decline in truck demand will free sheet steel for passenger car output. Only Chevrolet will fail to produce more trucks this year than in 1941.*



OIT Says Marshall Plan Needs May Necessitate Tighter Export Controls

Washington

• • • **Office of International** Trade officials this week were studying available supplies of a small group of iron and steel products not subject to export control with the aim of clamping controls on quickly if European requirements prove greater than presently anticipated.

Recent extension of control to 36 additional iron and steel products brought under export control more than 95 pct of the exports of steel mill products to all destinations except Canada. But "we still don't know the full requirements of the European nations under the Marshall Plan," one OIT official said. "It is possible that the impact of European needs may make it necessary to extend controls to the uncontrolled 5 pct."

Francis McIntire, director of export controls, told THE IRON AGE that lack of funds and personnel still is hampering OIT operations. "We will have to string along and hope to get more funds later," he said. All export controls now are due to expire Feb. 29, but extension for at least 1 year probably will be granted by Congress. The Senate Judiciary Committee already has begun hearings on a bill (S. 1807) introduced by Senator Cooper, R., Ky., and setting the expiration date at June 30, 1949.

The recent extension of export controls over iron and steel products was made after "careful analysis of the trend in exports in relation to the domestic supply," OIT said in announcing the new controls.

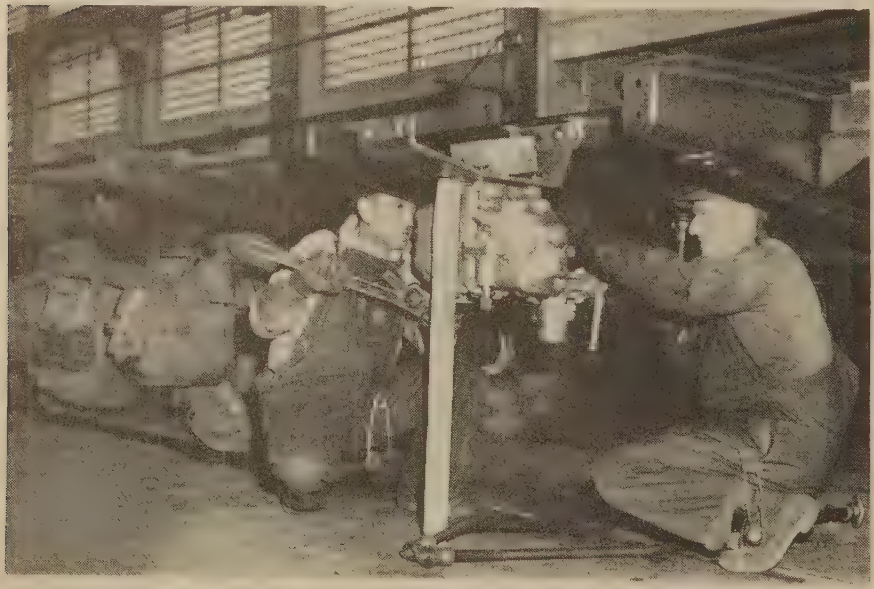
"The action was taken because of the continued domestic shortage of many steel products, caused principally by shortages of pig iron and scrap, required in the production of steel. Extension of these controls will afford more effective supervision over the destination of all steel exports and their end uses," OIT said.

Exports to Canada are exempted from control, under the Hyde Park agreement of 1941.

The products to be added to the Positive List are as follows: Plates — alloy and fabricated. Structural shapes — unfabricated, over 6 in.; fabricated, and unlined storage tanks. Sheet piling and skelp. Railway track materials—rails, 60 lb and over; rails, under 60 lb; relaying rails; rail joints, splice bars, etc. Semifinished products—carbon steel ingots, carbon steel billets, blooms, etc.; alloy steel ingots, alloy steel billets, blooms, etc. Bars—carbon, HR, over 1 in.; carbon, CF, over 1 in.; alloy iron. Sheets—ungalvanized carbon, 0.40 pct carbon and over; ungalvanized alloy steel. Cold-rolled strip—carbon strip, 0.40 pct carbon and over; carbon hoop band and scroll. Hot-rolled strip—carbon strip, 0.40 pct carbon and over; carbon hoop band and scroll. Pipe and tubing—seamless boiler tube, welded boiler tube, and pipe, iron and steel, NES. Wire—galvanized, barbed, baling, coils, musical instrument, piano, spring, bright steel for musical instruments. Railroad specialties—wheels, axles, axles with wheels. Forgings—carbon steel forgings and alloy steel forgings.

Included in the 5 pct category of uncontrolled items are woven wire fencing, wire strand, stainless steel items, cast iron screwed pipe fittings, railway spikes, bolts, washers, nut locks, switches, frogs and crossings, electric welding rods and wire, horseshoe nails and tacks; castings, including iron and steel, grey iron and malleable castings, and locomotive wheels and axles.

CAR BUILDERS: *These workmen are installing an air compressor for the brake system on what will be the undercarriage of a freight car. From this new assembly line of Northern Pacific Railway's Brainard, Minn., plant roll eight steel cars each day. This is a part of the company's program to expand its freight rolling stock* 1000 *cars by April* 1, 1948.



Republic Strikes Out At Gray Market Racket

Cleveland

• • • **Republic Steel Corp.** in an effort to keep its products from being involved in the black market, has designated T. F. Patton, vice-president and general counsel, to investigate any cases brought to its attention.

In a letter to customers, Jack M. Schlendorf, vice-president in charge of sales, stated that "Our company has printed and published prices on all our products. They may or may not be the same prices as some other steel company has, but in every case and on all commodities made and sold by Republic we sell only at our published prices.

"If you are offered steel by anyone purporting to have Republic steel for sale at other than these published prices, we would greatly appreciate hearing from you, as it is our intention to use every means at our command to break up the practice of black market selling.

"We have not sold a single pound of our product at other than our published prices and we do not intend to permit anyone else to injure the good name of Republic," Mr. Schlendorf stated in his letter.

Clad Metals Makers Raise Sights to Capture New Markets

Several Big Basic Steel Firms Are Reported Interested In Growing Industry

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

Pittsburgh

• • • **The clad metal** market is taking on the outward appearance of a gravy train. To the list of eight regular clad metal producers there may soon be added at least two large basic steel companies. One of today's top clad steel manufacturers is tripling capacity. Another has clammed up on production data, apparently feeling prospects look so bright too much new competition may hit the field. A new company, the first to concentrate exclusively on clad, plans to start production next year.

Another producer offers to license his patents and process to permit others to enter this market. New clad metals are being developed and market studies reveal almost untouched possibilities for today's products. It promises to be a rough and tumble battle from here on in.

For 1947 it is estimated that total sales of the clad metals industry will be about 12,000 net tons. Its principal products are combinations of stainless steel and carbon steel; carbon steel and copper; carbon steel and nickel, Inconel or Monel; and a relative newcomer, stainless and copper. Silver has also been clad on mild steel and on bronze. Other combinations are possible, depending on product demand. The clad metal may be applied to one or both sides of the base metal.

The clad metals salesmen's bow can be fitted with at least three strings: (1) His price may be lower than the solid high quality metal; (2) clad may be more efficient than solid stainless; or (3) it may be easier to fabricate.

A case where clad is more efficient than solid stainless is in cooking utensils. These are now being made of two types of "sandwiches" or "double armor"—stainless-carbon-stainless, and a newer one in which copper is the center metal. Both are said to have a distinct edge on solid stainless because the latter is such a poor heat conductor. Alone, it is reported, a stainless skillet will produce eggs fried "hard" at the center and "very easy" at the edges. The carbon and copper cores were developed because people like more uniform eggs.

For technical data on the ease with which double armored 18-8 can be drawn or spun see The Iron Age, *Mar. 6, 1941, p. 35. This article, "Armored Steel," by T. W. Lippert, describes "Pluramelt," a cladding process used by Allegheny Ludlum Steel Corp., and contains a patent review, "70 Years of Inventive Persistence." —Ed.*

Price is a ticklish subject with some stainless clad companies. They want to avoid a price war with solid stainless producers at this time. There is little likelihood of such a battle now and not much grounds on a cost basis. There are those acquainted with the development of the clad industry who predict (clad) price cuts—perhaps not for 5 years or so. But it will probably not be a price war then, according to this theory, for clad costs may come well below the solid product.

A Definition

• • • The clad metals we know today have been called that and a handful of other names, including armored steel, facings, and sandwiches. Several companies use trade names too. A clad metal may be defined roughly as one containing two dissimilar rolled metals inseparably bonded in a rolled product. The cladding or facing metal usually, though not necessarily, is more expensive than the base metal to which it is clad. The cladding may be on one or both sides.

This eliminates electroplating and similar processes from the scope of this report. Thermostatic bimetals, copper clad steel wire, and aluminum clad to duralumin are also excluded.

At present the price picture is favorable to clad where the cladding is on one side only. As an example, the base price of No. 304 solid stainless steel is 31.5¢ per lb for plate and 39¢ per lb for sheet. No. 304 stainless clad on mild steel —20 pct stainless on one side, 80 pct carbon steel—is 24¢ per lb for plate and 22¢ per lb for sheet. Nickel and Monel clad strip are said to be 30 to 35 pct cheaper than solid nickel or Monel. Copper clad mild steel strip sells for about 25 pct less than solid copper.

The price advantage is even more favorable for clad plate when types 316 or 347 stainless clad is contrasted with these types in the solid. Where types 410 or 430 stainless plate are involved the 10 pct clad is about 10¢ cheaper per lb than the solid; for 20 pct clad the advantage is about 6¢. Nickel or Inconel clad plate is substantially less than the solid.

Clad metal applications have generally come up from below rather than down from the solid metals. Where the clad producers have taken business from the solid stainless it has often been because clad metals were unobtainable when the original product was designed.

One of the first uses of clad metals in the 20th century came during the first World War when some European arsenals clad copper alloys to steel for bullet jackets. (This effectively skips about 6000 years of clad metal development beginning with Egyptian silver hammered onto copper. Other highlights include Sheffield plate in 18th century England and tool steel on mild steel in 19th century Germany.) During World War II most nations made bullet jackets of copper clad steel.

Major users of clad plate are in heavy process industries. For instance, oil refineries that once specified 4-in. thick plate to allow for corrosive action of some oils have switched to 2-in. plate clad on the interior with stainless steel.

A cereal manufacturer who uses salt and vinegar in his mix had to employ a magnet to extract particles of carbon steel tank linings from the finished product. Stainless clad process equipment has eliminated this metal pickup.

Some glass lined milk storage tanks and shipping tanks are being replaced by the stainless clad product. Less fragile. Wineries and breweries are now ordering it too. Concrete tanks sales are also being lost to the stainless clad product. The buyer now has a salable proposition, not limited to one spot. Therefore he can borrow money on it if he needs to.

Clad metals are beginning to invade the pulp and paper field where several types of equipment now tile lined are being replaced with stainless clad.

The applications just listed are mainly one-side clad propositions. Those where stainless is clad to mild steel or to copper are in a different class. Their relatively good drawing properties have already been described. They open up the field where heat diffusion is required.

No. 1 on this list today is household cooking utensils, industrial and restaurant heating and cooking applications. Though stainless steel is an excellent material for these products it is not too efficient as a transmitter of heat: The area immediately over the heat source gets hot, the portion a few inches away is much cooler. Answer: Use a core of carbon steel or copper to diffuse the heat throughout the vessel, and clad it with stainless on both sides for a permanent shine.

There is some disagreement on this product at the moment. Allegheny Ludlum, which has been marketing the carbon cored stainless for several years, asserts that the carbon core does a satisfactory heat diffusion job. American Cladmetals, which plans to be in production next year, favors a copper cored stainless clad product. It cites the fact that copper is the "master conductor."

One of the large basic steel producers is reported to have sold a quality of stainless-copper-stainless sheet for the cooking utensil trade. The price for this operation—believed to be still on an experimental basis—is said to be less than $1 per lb. Without taking sides, even the casual observer can see an excellent market for stainless clad cookingware, particularly in frying pans.

Stainless clad bumpers are an item for which Jessop Steel has high hopes. So far they have not been able to crash the mass production field against the competition of chromium plated carbon steel. But they are breaking in where the runs are not long enough for super-efficient chromium platers. Some test cars use them and some trucks and buses will probably be fitted with them next year. If electro or mechanical polishing can be developed for the stainless clad product the present narrow price gap will probably be closed. Few engineers doubt they will last longer than the current chrome plated product. Polishing cost now appears to be the only barrier to large scale production.

When the tin shortage cut off its meter plate supply, Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, turned to a copper clad carbon steel product. It was started off on an experimental basis but is now in volume production with eminently satisfactory performance reported. The copper is clad on both sides of carbon steel—10 pct on each side—and all joints soldered. The company considers it superior to the tinplate meter though it costs more.

An experimental copper-carbon-copper strip job promises good results. Automotive and diesel engine gaskets are being fabricated from it. In the face of higher internal pressures the new product promises to practically eliminate the blown gasket. At the same time the copper cladding is thick enough and soft enough to seat firmly.

Silver clad on steel or on bronze has been suggested for better electrical contacts. The sales argument is that silver doesn't oxidize like copper. Therefore it won't build up the oxide film that causes arcing and pitting. Initial attention will go to automotive and aviation parts where the pitting problem is more serious because the contacts and the currents are small.

Principal clad metal producers, in alphabetical order, are:

Allegheny Ludlum Steel Corp., Pittsburgh, makes stainless on carbon steel in sheets and plates clad on one or on both sides. A-L began making stainless clad steel—or armored steel—by the Pluramelt process in 1939. It sells sheets on a Pittsburgh base, plates on Pittsburgh and Coatesville bases.

Follansbee Steel Corp., Pittsburgh, has been known for some time as a manufacturer of stainless-copper stainless and copper clad on carbon steel. Trade rumors that the company is no longer interested in the clad field are denied by Follansbee spokesmen. It is understood, though, that the company is not actively pushing clad metals at present due to concentration on other products.

Granite City Steel Co., Granite City, Ill., manufactures stainless clad on carbon steel.

Ingersoll Steel Div., Borg-Warner Corp., Chicago, produces stainless clad on carbon under the trade name IngAclad, regularly with a 20 pct facing on one side

A Few Present and Potential Applications

—Clad metals shown in parenthesis—

Food and beverage industries:
  Cooking utensils (S-Cu-S; S-C-S)*
  Chocolate molds (M or Ni-C)
  Steam table inserts (S-Cu-S; S-C-S)
  Tanks, containers, vats for:
    Beer (S-C)*
    Cereals (S-C)*
    Grape juice (S-C)*
    Milk (S-C)*
    Wine (S-C)*

Oil refinery equipment (S-C) (M-C)
Paper and pulp (S-C) (N-C) (M-C)
Automotive:
  Accessories (S-C)*
  Bumpers (S-C)*
  Engine bearings (Ag-C)*
  Fog light shells (S-C)*
  Gaskets (Cu-C-Cu)

Chemical and allied products:
  Vessels, etc. (S-C) (M-C) (Ni-C)*
  Conveyor belts (M-C)
  Digesters (S-Cu-S) (S-C)*
  Fan Blades (Ni-C-Ni)
  Piping (S-C; S-Cu)

General:
  Bullet jackets (Cu-C)*
  Gas meters (Cu-C)*
  Radar equipment (S-Cu)*
  "Sheffield plate" (Ag-Cu)*
  Thermostats (Ni-Brass)*
  Water storage tanks (S-C)*
  Electrical contacts (Ag-C)
  Jet engine exh. cones (S-Cu-S)
  Radio Chassis (Cu-C)
  Refrigerators (S-C)

*Indicates commercial applications. Others are experimental or proposed. C = Carbon steel; S = Stainless steel; M = Monel.

only. Heavier cladding can be obtained if volume warrants. IngAclad is sold in sheets and plates on a Pittsburgh base.

Jessop Steel Co., Washington, Pa., is believed to be the nation's largest producer of clad metals. At present it manufactures stainless clad sheets and plate, clad on one side only, based at Pittsburgh and Washington, Pa. It is understood that development work now in progress will broaden its range of products. Next year it will probably have clad strip for sale. Present capacity of 500 tons of clad steel monthly will be boosted to 1500 tons by improvements now under way. Increased amperage for iron plating and modernization of equipment are planned. Jessop has a manufacturing and marketing arrangement with Alan Wood Steel Co., Conshohocken, Pa.

Lukens Steel Co., Coatesville, Pa., pioneered in nickel clad plate, in cooperation with The International Nickel Co. in 1930. It has been producing stainless clad plate for the past 10 years and began marketing the product itself this year. It sells nickel, Monel and Inconel clad plate on a Coatesville base and stainless clad on Coatesville and Pittsburgh bases.

Superior Steel Corp., Carnegie, Pa., specializes in strip which it sells under the trade name Su-Veneer clad metal. Cladding is 10 pct on one side or 10 pct on each (20 pct total). Copper, Monel and nickel are available on carbon steel on a Pittsburgh base.

American Cladmetals Co., Pittsburgh, is equipping its plant at Carnegie, Pa., and hopes to be in production early in 1948. Experimentally it has produced several items, with initial emphasis on stainless-copper-stainless for the cooking utensil market. It also proposes to clad copper or bronze on carbon steel, silver on steel or bronze and nickel on brass.

Railroads' Petition For Rate Increases Would Affect Steel

Washington

• • • **Rail rates** for shipments of iron ore will be increased 30¢ per ton on a permanent basis or 20¢ per ton over existing rates, if an amended petition for increased rates filed recently by the railroads with the Interstate Commerce Commission is granted.

The new request seeks over-all rate increases averaging 30 pct which would support emergency relief granted by ICC last month (THE IRON AGE, October 16, p 190).

The railroads said in their supplementary petition that the higher rates are necessary to offset rising costs resulting from higher wages and from rules changes for operating employees.

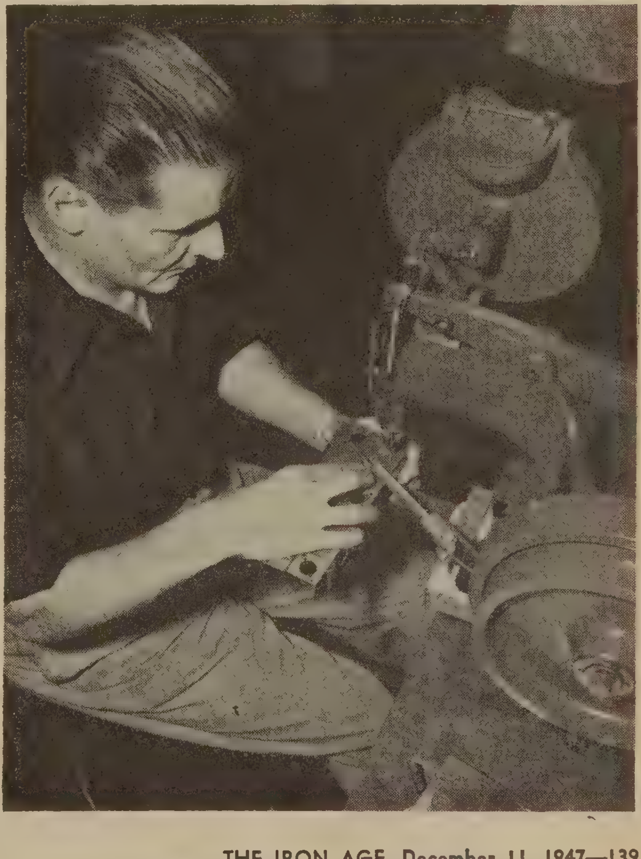
Rates for iron and steel products will be increased by the following amounts, if the new petition is granted: Eastern territory, 41 pct; Southern territory, 31 pct; Western territory, 31 pct; interterritorially between Southern and Western territories on the one hand and Eastern territory, 41 pct; interterritorially between Southern territory and Western territory, 31 pct.

These general percentage increases on the commodities listed below would be subject to maximum limitations of 11¢ per 100 lbs but not in excess of $2.20 per ton, net or gross as rated:

Axles, railway car or locomotive; iron and steel articles, manufactured; iron and steel; iron or steel scrap and articles taking same rates; nails, spikes and staples; pig iron; rails and railway track materials, iron or steel; tin or terneplate, scrap; tin mill black plate, scrap; trucks (without motors or generators), truck frames, railway car or locomotive; wire, iron or steel, not woven.

The increases on bituminous coal would be 30¢ per net ton or 34¢ per gross ton, except that increases of 40¢ and 45¢ respectively would apply on tidewater coal for transshipment as cargo or bunker coal to foreign countries (except Canada and Mexico) and to the Panama Canal Zone and insular possessions of the U. S.

Increases on coke would be 20¢ per net ton or 22¢ per gross ton where present rates are 75¢ or less per net ton and 84¢ or less per gross ton; 35¢ per net ton or 39¢ per gross ton where present rates are from 76¢ per net ton or 85¢ per gross ton to and including $1.50 per net ton or $1.68 per gross ton; and 50¢ per net ton or 56¢ per gross ton where present rates are over $1.50 per net ton or $1.68 per gross ton.



NEW FINGER SAVER: *John Mulligan, a maintenance mechanic, is shown demonstrating his latest invention, a safety guard for a riveting machine. When the plunger comes down on a rivet the finger is automatically knocked away from the danger area. The arm is synchronized to operate in conjunction with the foot treadle.*

Special Report . . .

The Skull Shows Us a Conversion Deal in the Making

Editor's note: This story was written by one of our editors. It is about 90 pct fact and the rest fiction and light handling. We run it without the editor's name or the names of his contacts. It points up in an amusing manner a serious situation which has occurred and does occur.

F.O.B. Everywhere

• • • **In the past** Macy's don't tell Gimbels in the steel business any more than in any other racket but I find that in the modern industrial motif this is not at all true and further I can pin this change to the new denominator—conversion. How I become aware of such strange conditions is quite a tale which goes something as follows:

The particular day whereof I speak finds me in Rudy's imbibing in a very special course of pizza with some of the cold stuff that makes Milwaukee famous on the side. Just as I am toying with the last delectable morsel of Rudy's current offering, I see coming through the revolving gate none other than my long time acquaintance The Skull.

Now The Skull is known far and wide in steel circles as a man so possessed with such pure unadulterated power of thought and action as to cause all who know him to make with the much respectful Yes Sir and general apple polish. Of course I remember The Skull from way back long before he migrates from the East and begets himself such a fine rep and I recall at the time he acquires this handle he is a melter in an openhearth shop.

My immediate reaction to his untimely appearance is to grab the menu, which I use to shield my face, as, at the moment, I do not in the least wish to see him. Still further, and more so, I do not wish him to see me, as a week previous I publish in the world's leading industrial bladder some facts which he announces at the top of his voice over my telephone cause him special annoyment.

Rudy's bill of fare is not exactly built to hide behind and I am having trouble concealing my chin, hairline and both ears simultaneously when lo my table is darkened by a large shadow who says in a loud ungentlemanly manner, how am I, what brings me here and other trite forms of salutation.

Feigning pleasant surprise I whisper "it's my pleasure" and that nothing will do but he park—which he promptly does, much to my discomfort. I am waiting for his opening salvo in which he will first doubt my sanity, next imply there is some question of the exact facts surrounding my birth and last threaten legal action to recoup all the potatoes our family journal causes him to part with.

This, of course, is standard greetings to all good reporters and I am intensely interested to learn whether the calibre of my work is going up or down. Expecting a genuine tirade, you will immediately appreciate why I almost fall off the chair when he says he is very glad to see me and that he is earnestly desirous of my company during the next few hours at a most important conference across the street.

The Skull's present position is one requiring vast amounts of front, know how and plain duodenal audacity, all of which he has in unlimited quantities. Translated this means he is a steel broker, procurement agent, industrial coordinator or whatever you wish in this game of finders keepers, involving ingots, slabs, sheets, scrap or what have you.

As his game is strictly legit, he mingles with many big wheels of the steel producers and consumers plants alike. He not only mingles but makes book on many deals which qualifies him as an excellent contact for a struggling public relations beleaguered reporter.

Why he should suddenly solicit my counsel, particularly in public or with witnesses, piques my curiosity, so I, with my usual tact, demand, "What's the deal?" He replies that he is instrumental in bringing together two very large factors in the steel industry. One he says makes it, the other uses it and to the mutual interest of all concerned he fosters this tete-a-tete.

I say, "Where do I fit?" He replies that in previous meetings the various factions have had the gall to question his judgment and he wants a qualified, unbiased referee present at the final sewing up of the deal.

I suspect aloud that the questions he refers to involve the stuff that makes all of us liars on Mar. 15. He admits "could be" and adds that with the understanding that everything's off the record his invitation is firm. I nod assent, with the conviction that I know more ways to get it on the record than he knows to keep it off, so we leave.

On entering the citadel directly opposite Rudy's he doesn't even consult the directory, but barges into the elevator and names the floor on which the sales manager of this particular steel company plays hide and seek with the encamped steel customers whose business he once was foolish enough to solicit.

We walk into the hallowed inner chamber entirely unannounced and find the erstwhile sales manager and the purchasing agent of a very large consumer in a tight huddle. The Skull says they should not be surprised as everything is level and that this news hound parks his scenter at the door and will for the balance of the evening function solely as a consultant, and arbitrator who tomorrow will be most absent minded about tonight's proceedings—or else.

To my complete amazement the salesman announces that for my benefit he will summarize the project so as to bring me up to date and thereby facilitate my grasping the situation. At the same time he implies it will serve to refresh the memories of the others present. The home team behind the expensive desk then gives with the pitch that our illustrious colleague from the shores of Gitchigumee is searching for additional supplies of stuff from which his company makes front fenders. The P.A. volunteers that for many unfounded reasons he is unable to procure enough of this stuff lately and this group gathers to arrange a meeting of the minds on how to augment his present meager allotment.

I am wondering how The Skull gets tied in with front fenders when the same says he is the key to the situation as he has at his disposal many tons of excellent electric furnace ingots from which it is possible through devious and complicated processes, plus extras, to convert into the stuff the P.A.'s boss directs must be had come hell or high freight rates.

The salesman goes on that it so happens his particular facilities are such that he has open space on his rolling mill which he is willing to permit the P.A. to use purely as a courtesy. The P.A. interrupts that the outsider is not so naive as the salesman thinks, why doesn't he just tell me that the rolling time is available on a rental basis at an exorbitant fee. The salesman barks that he sells the hot rolled coils to the P.A. at the price I mark in the book and how does he get that way.

The P.A. yells that the salesman conveniently forgets to mention that he pays the P.A. only $32 for the same ingots that The Skull socks him $93 for, and, to make it worse, he has to buy the coils in net tons and ingots in gross tons and somewhere in between these characters lose 30 pct of the gross tonnage, and turning to me he screams, "doesn't that scald your barnacles?"

Sensing that short tempers threaten to wreck the deal, The Skull patiently and accurately explains that the 30 pct loss in conversion from ingot to coil is standard practice for quality material. The P.A. objects to the word "quality" and says to me that these clowns even ask him to waive all the specifications ordinarily governing such steel and goes on to say that instead of the buyer writing the specs the mill insists on doing it and what guarantee do they have this stuff will come off the front fender press in one piece? The salesman retorts The Skull's ingots always work satisfactorily elsewhere and offers references who the P.A. may call if he wishes. Things are quieting down somewhat when the P.A. demands, "What is the published price of carbon ingots?" I reply "$46 a gross ton f.o.b. Pittsburgh."

The P.A. inquires just how does The Skull arrive at $93. The Skull says these are the electric furnace kind and the P.A. says the price book only allows $10 a ton extra for electric furnace and that he smells a herring. And since when do they change the periodic table so as to transform Fe into a precious metal. The salesman adds that the herring is scrap which since OPA becomes quite precious table or no table. The Skull informs the P.A. that his price is not at all out of line when we consider he has to buy scrap at $45 or maybe $50.

The P.A., who has evidently learned much more about steelmaking than I think is possible, points out, "Don't you use scrap to make the ingots which the good book lists at 46 bucks?" This is a very pointed question, the answer to which is ticklish indeed and I am wondering how The Skull and the salesman will handle it. I start to say that today we have two kinds of scrap prices, when the salesman points out that the price I carry in the book is fictitious, "No one can sell ingots at such a figure except at a loss."

This causes the P.A. to comment if such conditions become known a certain alphabetical agency is very likely to pack them all off to the cooler. The salesman smiles and replies that for 10 years a certain agency tries no end to make the nine old men agree on how to spell cement backwards and until they accomplish this most difficult feat "everything is rosy."

At this point The Skull announces we inadvertently wander from the subject, "Let's get down to cases." The P.A. pulls a sheaf of paper from his brief case and says OK there is the entire flat rolled requirement of all his plants with sizes, tonnages, grades and specifications. The Skull reminds him we will skip the last word entirely and concentrate on size and tonnages. The salesman retaliates by handing the P.A. a big table which lists all the sizes of sheet, strip, etc. that his mill makes, with the tonnage shown for each mill unit. Two years ago such things would be heresy, but evidently they are not afraid of losing their jobs by so letting down their respective hair and The Skull is studying first one sheet then the other.

The salesman points out a narrow strip requirement and says "this item we can handle with ease." The P.A. says his shop doesn't care to start building weldments for front fenders. "Ah yes" says the salesman "but how about the frame requirement that you shout about only last week?" I start to appreciate why The Skull can charge what he does for his service when he reminds the salesman that there is no use talking about this item as he does not have at his disposal the proper mold sizes to furnish ingots wherefrom such strip can economically be made.

So we turn our attention to the 72 in. wide sheets which the P.A. has underlined in red pencil. The salesman asks the P.A., "Do the designers of the new cars ever stop to consider steel mill rolling facilities when they dream up a new wagon?" The P.A. replies, "This should not be necessary if you steel

KRUPP GHOST: *This part of the huge Krupp works at Essen, Germany, used in the production of machines of war, is in the process of being dismantled. In the lower foreground, only the steel skeleton of one of the buildings remains standing. These buildings form only a portion of the huge steel works which were the mainstay of Germany's Ruhr armament works.*

barons will just take the time to keep abreast of technological progress, modern design trends, etc." He continues that if they don't soon pay some attention to future business his company will build their own mill. This statement, of course is for the birds because ever since I get in this racket I hear such threats none of which come true.

The Skull is busy figuring on the back of an envolope and suddenly says "OK we will melt some 0.08 max carbon steel and pour it into 20 x 40 in. molds." The salesman says, "How heavy?" The Skull says he can adjust the weight by the height of pour and it appears they should settle for a 62 in. high ingot. The P.A. again displays his recent intensive education by asking "Is that to the shoulder or the end of the hot top?" The salesman says we should slow down, as he understands The Skull will make ingots of the rimming type.

At this the P.A. jumps up and yells that's what we get for striking out the specifications business and he knows from experience the only thing that will work is fully killed low carbon steel of deep drawing non-aging quality and he will buy only that "to hell with reasonable facsimiles." The Skull adds he can make anything the P.A.'s heart desires but "just forget to write the specs on the order." This practice he explains creates great confusion at the mills where he has such good ins.

Finally they settle for the 20 x 40 molds size, only The Skull gets them to agree to big end down molds with no hot top, and in lieu of this concession he will fully kill the stuff so it will draw so good the P.A. can make cartridge cases if he wants to. Of course, The Skull forgets to add that killed steel made this way increases the top discard on account of pipe, but evidently the P.A.'s education hasn't got this far.

I am sitting there figuring how I can best present this story in full 10 point bold face type when the P.A. explains, "Wait!" He indicates that the width of the hot-rolled coils must be 72 in. and The Skull proposes ingots only 40 in. wide, "How come?" The salesman also seems perturbed at this but The Skull says, "The hot mill can cross roll to width on one of the roughing stands." Again I mark up to The Skull's credit another reason why he can demand $5 a ton engineering fee and start to wonder where the salesman spends his time.

In about 20 min the processing details are all in line and I am thinking that my presence has been grossly overestimated when they all turn on me with, "What is the price of No. 1 heavy melting scrap?" Not to be caught on my insteps I reply, "Where?" The Skull says at his melting tie-in, natch.

Before I can answer the question the P.A. says he sells it to this plant for 40 bucks and he is most careful to earmark it so he knows it gets there and that should settle that. The salesman says, "Earmarked scrap is one thing but other scrap is another." "What is he talking about?" the P.A. asks, so I explain the difference.

As a matter of curiosity I ask the salesman what his company pays for free market scrap and he says anywhere from $5 to $10 more than earmarked. Now this is a revelation indeed, as every week I talk to the scrap buyer of this same company who always tells me he pays no more than the $40 delivered for any scrap; all the time he has his right hand raised high over his head.

I finally tell the group that at the moment The Skull will have to pay about $47 delivered for decent heavy melting and the P.A. says, "Oh no we don't," he will earmark the already earmarked stuff to The Skull. I point out that this he should not do, lest the mills who were getting it cut his quota. Being astute in all matters, the P.A. suddenly subsides and says OK, so the alert one who brings me to this conflab gets $93 a gross ton, "now what?".

The salesman says he will buy these same ingots delivered to his mill at $32. The P.A. says how about my price which reads $46 and the salesman says the difference represents profit and overhead, and he insists on buying them at a price equal to what it costs to make the same ingots in his plant. At this the P.A. really waxes incandescent by recalling that the home team says an hour ago that no one can sell ingots for $46 and make money and now they try to tell him the things only cost $32 to make, "who's kidding who and a joke is a joke but only for so long!"

Running his fingers through where his hair used to be, the salesman says to the P.A. how much does he pay for the type of sheets he wants on the gray market if he can get them. The P.A. replies that at the rate the charges are piling up these conversion sheets are going to cost more than the highest gray market tags he ever hears of. The Skull chimes in that gray market is pig-in-the-poke stuff while this conversion steel is top-quality, first-rate merchandise in every respect.

I ask the P.A. why will the sheets cost so much and he explains that already our friends here nick him for $93, less $32, plus 30 pct over

TRACTORS FOR FOOD: *Ford Motor Co., Ltd., of Dagenham, England, is now producing tractors at the rate of 160 per day, compared with the prewar rate of 50 per day. British farmers hope these tractors will help speed the government's agricultural plan designed to raise the country's production some 20 pct. Also to benefit will be farmers throughout Europe, to whom Britain is exporting thousands of the tractors.*

the standard hot-rolled coil price, and with that he only has 14 gage coils which he must cart elsewhere for pickling and cold rolling to 20 gage and cutting into proper sizes. He goes on that for these most simple operations he not only pays stiff freight rates but astronomical assessments to all concerned.

I am thinking that rather would I have one carload of front fenders than all the stuff buried at Ft. Knox. Meanwhile the P.A. is propositioning the boys on shaving their quotations somewhat, but with arms cross their chests they smile and wag their pins sideways. Now, the steel company, as I see it, has a pretty good deal, with The Skull it's a lead pipe cinch and the P.A., I take for granted must pay or else. This, however, proves not to be the case.

The P.A. is figuring like mad, all the time mumbling certain vernacular phrases, for which he is quite famous, and all at once he says to the salesman what is his management trying to do "amortize the Marshall Plan through conversion?" To this the salesman is genuinely surprised and makes like such talk is insulting. The P.A. gets up, runs around the desk, throws down the paper he has been scribbling on, pounds the back bar and shouts, "Cripes, what chiselers I meet lately!"

Pointing to the figures all the while he is waving his other hand, he in vibrant tones points out that, on the first thousand tons of The Skull's electric furnace jewelry they will roll, the mill gets to keep 300 gross tons of nice heavy melting scrap which when converted to the lowest scrap price, makes exactly 12,000 simoleons in the pants pocket. And they still have the guts to bill him for the coils and only offer a paltry $32 for The Skull's 24 kg ingots which cost 93 kopeks f.o.b. half way to Siberia. Well, what transpires from here on in is quite interesting but also quite difficult to put in print. I get home at one of the weest possible hours, and, of course, my cupcake doesn't quite believe that I lose so much sleep purely for altruistic reasons, and I have to commit myself for a full day's tour of Gimbels, basement store excluded, before she permits me the courtesy of getting into my house.

Next morning about 10 I give The Skull a ring and casually inquire if the deal is yet consummated. He tells me the P.A. will confirm it in writing within 24 hr and everything is set, with no price adjustments. For the next 2 days I am up to my ears in copy, plus making up to my most adorable mate with flowers, et al, all of which I am having a hell of a fine time trying to write off on the swindle sheet.

Along about Friday I drop into Rudy's for the free snacks and Rudy wags his head towards the corner and says, "Too bad." I follow his gaze and there slumps The Skull in a very pitiful condition with assorted empty containers piled nearby. This I can't believe, so I go over to check. I say, "How now, blue cow" and other words of solace plus "what's the matter," as no time in our long acquaintance do I ever see The Skull in anything but a sober businesslike condition.

He mumbles what happens to him shouldn't befall even a Communist. I am not of nibby nature so I say nothing, just pick up one of his shoes and place it under the table, pat him on the shoulder and leave saying, "If there is anything I can do leave the list with my steno."

On the way out Rudy stops me. I say what gives with our mutual friend, "Maybe behind all this is a Judy?" Rudy says I should know better, "It's even worse." What is worse than Judy trouble I can't imagine, so I bite with, "What!" Rudy says all he knows is that The Skull is there when Rudy opens the joint demanding six fifths of the best, plus four cases of suds be allocated him so he can properly celebrate the latest monstrosity in modern design—the aluminum front fender.

---

50 YEARS AGO

THE IRON AGE, *December 9, 1897*

- "The American newspapers are printing, with pardonable gratification, many of the comments made abroad upon the invasion of markets by products of the American furnace, forge and shop. We must confess that we usually regard such statements with some suspicion. The motive naturally is not to do justice to the quality or low cost of our products or to recognize our enterprise. We do not expect our rivals to advertise us and have every reason to be satisfied if they do not misrepresent us."

- **"A successful submarine boat is reported to have been built at Oshkosh, Wisconsin, by Richard Raddaty, a young mechanical genius of that city. With its turret protruding above water, it has made 14 mph."**

- "The progress of the iron industry is such that it will not be long before strict specifications govern the production of castings for structural and other work, and founders might then wish they had made the first move toward standard methods of testing their work. . . ." From a paper presented by Dr. R. Modenke, McConway-Torley Co., Pittsburgh, at the annual Pittsburgh Foundry Association meeting.

- **"The Interstate Commerce Commission reports that out of 436 railroads, only 75 roads, or 17.2 pct will be equipped with automatic couplers by Jan. 1, 1898, the deadline."**

- "Illinois Steel Co. have invented a method for recarburizing Bessemer in open-hearth steel direct from the speigel furnace. By taking the metal directly from the blast furnace instead of running it into pigs, considerable saving in cost is made possible."

- "A tube forming press has been marketed by E. W. Bliss Co., Brooklyn, N. Y., which will form tubes up to 10 in. long with one blow, either straight, round, taper, oval or square. The operator can form 20 tubes or more per minute."

Industrial Briefs . . .

- **CENTENNIAL**—Allis-Chalmers Mfg. Co., Milwaukee, is rounding out a 100 year record of engineering and manufacturing achievement, with 30,000 employees in nine plants.

- **SALES REPRESENTATIVE**—Effective Jan. 1, the newly formed Index Machine Co. of Jackson, Mich., will become the sales representative for the Index Machine & Tool Co., of the same city.

- **ACQUISITION** — The Buffalo Bolt Co., North Tonawanda, N. Y., has acquired the outstanding capital stock of Penberthy Injector Co., Detroit. All Penberthy's management and personnel will remain unchanged.

- **NEW COMPANY**—The Visual Planning Equipment Co., 6247 Broad St., Pittsburgh, has been organized for the design, promotion and sale of three-dimensional planning equipment. Homer H. Dasey is president.

- **OPEN HOUSE** — More than 2000 persons attended an open house party recently held at the Fairbanks, Morse & Co. Westco Works, St. Louis, to celebrate the opening of their new $150,000 office and warehouse addition.

- **FOUNDRY FOR SALE** — WAA has invited bids for the purchase of an alloy steel casting foundry in East St. Louis, Ill. Proposals must be submitted to the WAA Regional Office, Kansas City, Mo., before Dec. 22. The plant has a capacity of 450 tons of steel castings per month and consists of a 6 acre land site, a main foundry building, a pattern storage building, an office building and a number of small auxiliary buildings.

- **CHILEAN STEEL PLANT**—Koppers Co., Inc., and Compania de Acero del Pacifico of Chile (Pacific Steel Co.) has announced the signing of a basic contract by which Koppers will have supervision of construction, engineering, and management of the first integrated steel plant to be built in Chile at a cost in excess of $50 million. The entire plant is expected to be in operation by the end of 1949.

- **GURLEY TO ENTERTAIN**—Invitations to attend a "See-Us-At-Work Open House" at the W. & L. E. Gurley plant in Troy, N. Y., on Dec. 16 were mailed recently to the families of all employees.

- **HELP WANTED** — Allis-Chalmers Mfg. Co. has started a drive to hire 1540 men and build night shifts of the West Allis Works, to a record peacetime high.

- **ENTERS NEW FIELD** — Rust Engineering Co., Pittsburgh, has announced formation of a new process engineering division to extend its design and construction services to the chemical, petroleum, and related industries.

- **ANNIVERSARY**—The Elizabeth Iron Works, Elizabeth, N. J., fabricators of structural steel and manufacturers of materials handling equipment, celebrates its fortieth anniversary this year.

- **FOUNDRY SCHOLARSHIPS**—Five students in the college of engineering, University of Wisconsin, have been named to receive $500 schoalships provided by the American Foundrymen's Assn. to promote interest in the foundry industry.

- **HOTPOINT PROGRAM** — Hotpoint, Inc., a General Electric affiliate, which purchased Plants 2 and 3 of the wartime Allis-Chalmers supercharge plant at Milwaukee, plans to start operations in mid-December. The firm also intends to start on an additional building for heavy presses, storage and shipping docks to cost $750,000.

C-I Raises Tinplate; Some Grades Separated

Pittsburgh

• • • **Carnegie-Illinois** Steel Corp., effective Jan. 1, 1948, and applicable for the entire year 1948, has announced the following prices for its tin mill products per base box of 100 lb basis weight at Pittsburgh and Gary, plus applicable switching or transportation charges in effect at time of shipment:

> Electrolytic tinplate; 0.25 lb coating—$5.80. Electrolytic tinplate; 0.50 lb coating—$6.00. Electrolytic tinplate; 0.75 lb coating—$6.20. Hot-dipped tinplate; 1.25 lb coating (Pot Yield)—$6.60. Hot-dipped tinplate; 1.50 lb coating (Pot Yield)—$6.80. Can making quality black plate: 55 to 70 lb basis weight inclusive—$5.20; 75 to 95 lb basis weight inclusive—$5.10; 100 to 128 lb basis weight inclusive—$5.20. Special coated manufacturing ternes—$5.90.

Prior to this announcement, Carnegie-Illinois had in effect a single price for both 1.50 lb and 1.25 lb coating weights. This price was determined by averaging the comparatively small quantity of tinplate produced carrying 1.50 lb coating with the much larger quantity produced carrying 1.25 lb coating. This is the first time a special price has been named for 1.25 lb coating now almost universally used in accordance with government directives where hot dipped coke tinplate is required.

Portsmouth Steel Corp. Installs New Sheet Mill

Cleveland

• • • **To help relieve critical material** shortage of hot rolled sheets, Portsmouth Steel Corp., Portsmouth, Ohio, announced this week the installation of a mechanized non-continuous sheet mill with an annual capacity of 100,000 tons, that is scheduled to be in production by the second quarter of 1948.

The mill will be devoted to production of carbon and alloy sheet specialties most adaptably rolled on this type of mill once the critical shortage of hot rolled sheets has been relieved.

The mill will also provide the foundation for a continuous strip mill that can be installed at a later date. It was bought from the John Lundgate Associates, Pittsburgh, and will be shifted from its present site at St. Sault Marie, Ontario, to Portsmouth.

Weekly Gallup Polls . . .

Can GOP Handle Price Situation Better Than Democrats?

Princeton, N. J.

• • • **The voters of the country are** not convinced that the Republican Party could handle the problem of prices more effectively than the Democratic Party, according to George Gallup, director, American Institute of Public Opinion.

While neither of the two major parties is given a clear vote of confidence in the matter of handling the high cost of living, nevertheless the Democrats seem to have a slight advantage in public estimation. Among low income voters particularly there is a wide belief that the Democrats can handle the price situation better than the Republicans can.

This nationwide poll has especial significance in view of Sen. Robert A. Taft's lashing attack on President Truman's program for attempting to control prices. Senator Taft's attack has brought criticism from a number of his fellow Republican senators who have claimed that the Taft attitude is too "negative."

To see how the public lines up in this affair, the institute polled voters from coast-to-coast on the question:

> "Which political party—the Democratic or Republican—do you think can best handle the problem of high prices during the next few years?"

The vote is:

	Pct
Democrats can handle best	35
Republicans can handle best	30
No difference	19
No opinion	16

The question of prices is likely to be in the forefront in next year's presidential campaign. Judging by the above results, the Republicans will have to do some skillful talking if they are to convince the general voting population that they can do better than the Truman Administration when it comes to controlling the cost of living.

Other recent surveys have shown that the GOP likewise faces certain difficulties in persuading the public that Republicans can handle foreign and domestic affairs more effectively than the Democrats. Survey figures show that, as between the two major parties, the weight of opinion is more favorable today toward the Democrats as best able to deal with foreign countries and to handle general problems here at home.

In today's survey, the Democrats are given their highest vote of confidence by the manual worker group in the population and the farmers, as the following table indicates.

	Dems. Best Pct	GOP Best Pct	No Diff. Pct	No Opin. Pct
Prof. & Bus.	28	39	23	10
White collar	35	33	19	13
Farmers	36	27	21	16
Manual workers	38	26	18	18

•

Voters List Germany, Greece Worst Off; Side With Action on Hollywood Witnesses

• • • **While Congress debates** the issue of aid to stricken European countries, the American public regards Germany, Greece, Poland, Italy and England as the five worst off countries in Europe today.

France is listed next in the parade of unfortunate nations.

So far as the American public is concerned Austria seems to be a sort of forgotten nation—less than 1 pct of voters mention her as one of the worst off countries.

Comparatively few Americans, of course, have any first-hand knowledge of conditions in the various parts of Europe. Their estimates of the amount of distress in each country are based almost entirely on impressions gained from reading newspaper reports or from radio broadcasts describing conditions. Greece and Germany have been given much more publicity than little Austria and some of the other nations.

From coast-to-coast the institute put this question to a cross-section of the American voting population:

> "Which European country do you regard as worst off today?"

The vote follows:

	Pct
Germany	25
Greece	12
Poland	8
Italy	8
England	8
France	7
Russia	4
Czechoslovakia	1
Norway	1
Bulgaria	1
Holland	1
Others	1
"All Europe"	8
No opinion	17
	102

(Totals more than 100 pct because some voters named more than one country.)

There are some interesting contrasts between the foregoing list and the results of a similar poll conducted recently in France by the French Institute of Public Opinion.

French voters were asked what countries in the world they consider worst off.

The French put Greece first on the list as the country suffering the most. Then the French public listed France as the second worst off nation in Europe.

The results of the French poll follow:

> "In your opinion which is the country where things are the worst now?"

POLL IN FRANCE

	Pct
Greece	19
France	16
Spain	11
Germany	8
Italy	8
Great Britain	4
Indo-China	5
Palestine	5
Poland	3
Rumania	1
Belgium	1
China	1
Other	6
Don't know	12

•

• • • **The House contempt** citation against the Hollywood inquiry witnesses who refused to say whether they are members of the Communist Party is in line with the main sentiment of the voting population.

Voters who had heard or read about the Congressional investiga-

(CONTINUED ON PAGE 171)

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

890 **Tons,** Santa Barbara County, Calif., bridges across Nojoqui Creek and Santa Ynez River near Buellton, through C. B. Tuttle Co. to Columbia Steel Co., Los Angeles.

700 **Tons,** Chicago, board of education elementary and high school building to American Bridge Co., Pittsburgh.

450 **Tons,** Salt Lake City, Fabricating plant for Chicago Bridge & Iron Co. to Consolidated Steel Co., Los Angeles.

240 **Tons,** Chicago, department store for Goldblatt Bros. Co., to Calumet Iron & Supply Co.

210 **Tons,** Cone, Iowa, plate girder bridge for the Milwaukee R. R. to American Bridge Co., Pittsburgh.

205 **Tons,** Morton Grove, Ill., factory building for Middleby Marshall Oven Co. to American Bridge Co., Pittsburgh.

180 **Tons,** Rock County, Wis., Bridge F-014-5 to American Bridge Co., Pittsburgh.

150 **Tons,** Trussville, Ala., high school stadium for Jefferson County school board, to Virginia Bridge Co., Birmingham.

150 **Tons,** Hueytown, Ala., high school stadium for Jefferson County school board, to Virginia Bridge Co., Birmingham.

100 **Tons,** Dauphin County, Pa., bridge, Pennsylvania Dept. of Highways, to Bethlehem Steel Co., Bethlehem.

• • • **Fabricated steel inquiries** this week included the following:

5000 **Tons,** Chesapeake City, Md., U. S. Army Dept., bridge over Chesapeake and Delaware Canal, Jan. 20.

2000 **Tons,** Aimes, Iowa, power house, Iowa State College. Bids close Dec. 20.

2000 **Tons,** Alta Vista, Va., board bland for U. S. Gypsum Co.

450 **Tons,** Camden County, N. J., two bridges, New Jersey Dept. of Highways, Dec. 23.

325 **Tons,** Saratoga, Wyo., superstructure for Platte River bridge, State Highway Commission, Cheyenne, bids to Dec. 12.

250 **Tons,** Chicago, new plant for Reuter Bros. Iron Works.

195 **Tons,** Madison County, Mont., bridge over Beaverhead River on Dillon-Twin Bridges Road, Montana Highway Commission, Helena, bids to Dec. 10.

145 **Tons,** Prairie County, Mont., bridge over O'Fallon Creek on Terry-Glendive Road, Montana Highway Commission, Helena, bids to Dec. 10.

145 **Tons,** Gallatin County, Mont., bridge over Madison River on Three Forks-Carpenter Road, Montana Highway Commission, Helena, bids to Dec. 10.

125 **Tons,** Gallatin County, Mont., bridge, Yellowstone Trail near Central Park, Montana Highway Commission, Helena, bids to Dec. 10.

• • • **Reinforcing bar awards** this week included the following:

225 **Tons,** Santa Barbara County, Calif., bridges across Nojoqui Creek and Santa Ynez River near Buellton, through C. B. Tuttle Co. to J. T. Ryerson & Son, Los Angeles.

• • • **Reinforcing bar inquiries** this week included the following:

1200 **Tons,** Des Moines, Iowa, water softening plant for the city of Des Moines. A. H. Neumenn & Bros., low bidder.

620 **Tons,** Los Angeles, two undercrossings and one overcrossing on Hollywood Parkway and Virgil Ave., Hoover St. and Rosemont Ave., California Div. of Highways, Los Angeles, bids to Jan. 8.

600 **Tons,** Minneapolis, building for Jensen Printing Co., James Leck, contractor.

• • • **Railroad awards** this week included the following:

The C & O has ordered from Pressed Steel Car Co. 200 70-ton all steel box cars. The Union Pacific R. R. has ordered 189 diesel electric locomotives split as follows—80 freight locos to Electro Motive, 48 freight locos to American Locomotive, 8 passenger locomotives to American, 12 passenger locomotives to Electro Motive, 20 switchers to Electro Motive, 15 road switchers to American Locomotive, 5 switchers to Baldwin Locomotive, 2000-hp heavy locomotive to Fairbanks Morse.

Electromet Announces Price Increases In Silicon, Chrome Alloys

New York

• • • **Price increases in its silicon** and chromium alloys, together with increases in differentials for packing and quantity, have been announced by Electro Metallurgical Sales Corp., effective Jan. 1 for contract sales, immediately for spot sales. There are no changes in base prices of calcium metal, or alloys of vanadium, tungsten, zirconium, columbium or titanium.

Packing differentials are increased by about $4.00 per net ton. Premiums are to be charged for packages smaller than the 500 lb standard, or for briquets in smaller than 250 lb bags.

The premium for l.c.l. shipments has been increased by about 0.4¢ per lb of material. The premium for less-than-ton lots has been increased by about 0.5¢ per lb.

All grades of high-carbon ferrochrome are increased 1.00¢ per lb of contained chromium. Low-carbon ferrochrome grades are raised 1.5¢, except 2 pct C, up 1.75¢, and SM grades, up 2.00¢. Silicomanganese grades are up 0.4¢ per lb of material.

The following new contract base prices are for lump size, in bulk or packed where shipment cannot be made in bulk, for delivery in the eastern zone:

Ferrosilicon	Per Pound Metal Contained
50 pct	9.30¢
65 pct, low-A1	12.10¢
75 pct	11.80¢
85 pct	13.30¢
90 pct	15.00¢
90 pct, low-A1	15.70¢
Ferrochrome, high-C	18.60¢

	Per Pound Of Alloy
SMZ alloy	15.00¢
CMSZ alloy	16.50¢
Silcaz alloy	39.00¢
Calcium-silicon	16.25¢
Calcium-manganese-silicon	17.50¢

Briquetted alloys	Per Pound Of Briquet
Silicon, 2 lb	5.10¢
Silicon, 1 lb	5.25¢
Chromium	12.50¢
Ferromanganese	8.70¢
Silicomanganese	8.75¢

Silicon metal prices are increased 0.8¢ per lb of silicon contained. The low-carbon grade of chromium metal is up 5.00¢; the high-carbon grade is up 3.00¢ per lb of metal contained.

Coming Events

Dec. 11-13 **Electron Microscope Society of America, annual meeting, Philadelphia.**

Dec. 26-31 American Assn. for the Advancement of Science, annual meeting, Chicago.

1948

Jan. 12-16 Society of Automotive Engineers, annual meeting, Detroit.

Jan. 12-16 National Materials Handling Exposition, Cleveland.

Jan. 19-20 Institute of Scrap Iron & Steel, Inc., annual convention, Chicago.

Jan. 21-24 American Society of Civil Engineers, annual meeting, New York.

Feb. 10-11 Pressed Metal Institute, annual meeting, Buffalo.

Feb. 15-19 American Institute of Mechanical Engineers, annual meeting, New York.

Mar. 3-5 Society of Automotive Engineers, national passenger car meeting, Detroit.

Mar. 18-19 Magnesium Assn., annual meeting, New York.

Apr. 5-8 Southern Machinery and Metals Exposition, Atlanta.

Apr. 5-8 National Assn. of Corrosion Engineers, annual conference and exhibition, St. Louis.

Apr. 12-14 Openhearth Steel Committee and Coke Oven, Blast Furnace and Raw Materials Committee, AIME, annual conference, Pittsburgh.

Canadian Iron, Steel Shapes Production For September Announced

Toronto

• • • **Canadian production** of primary iron and steel shapes for the month of September totalled 256,972 net tons as compared with 234,601 tons in August and with 71,341 tons in September 1946. The big increase for September this year over that of 1946 is due to the fact that last year labor strikes closed entirely two of the three major steel mills in Canada and reduced operations of the Hamilton mills to less than 60 pct of capacity. Output for September included 248,059 tons of carbon steel shapes and 8913 tons of alloy steel shapes. In the production figures for September are included 63,552 tons shipped to producers' own plants or to other plants within the primary industry for further processing.

Shipments of primary iron and steel shapes in September amounted to 184,182 net tons, of which 175,536 tons were carbon shapes and 8646 tons alloy shapes; in August shipments totalled 182,324 tons, including 172,301 tons of carbon and 10,023 tons of alloy shapes, and for September 1946, when steel production was sharply reduced through strikes, shipments amounted to 61,141 tons, including 57,356 tons of carbon and 3785 tons of alloy steel shapes. The above figures, which show iron and steel shapes for sale, do not include deliveries for further processing.

For the nine months ending with September, production of primary iron and steel shapes totalled 2,351,624 net tons, while shipments for sale amounted to 1,764,785 tons and deliveries for producers' interchange amounted to 587,726 tons. For the corresponding period of last year production totalled 1,733,141 tons, and shipments for sale 1,404,561 tons, and producers' interchange 321,368 tons.

Table I shows production and shipments for sale of primary iron and steel shapes for the month of September in net tons.

Producers' shipments of primary iron and steel shapes, subdivided according to principal consuming industries for the month of September of net tons, are shown in table II.

TABLE I

Alloy and Carbon Steel Production and Shipments

	Carbon Steel		Alloy Steel	
September 1947	Made	Shipped	Made	Shipped
Billets, etc., for forging	7,951	4,951	602	714
Other semi-finished shapes, not for re-rolling by makers	30,258	322	194	...
Structural shapes and piling	12,327	12,571	...	...
Plates	14,817	13,517	11	5
Rails	29,153	22,153	...	...
Tie plates and track material—				
Splice bars	59	150	...	...
Tie plates	1,626	2,344	...	...
Spikes	730	766	...	...
Tool steel	120	150	414	362
Concrete reinforcing bars	7,569	6,618	...	...
Hot rolled bars for cold finishing	1,816	....	...	...
Other hot rolled bars	38,296	36,807	5,604	5,827
Pipes and tubes	11,226	10,818	...	...
Wire rods	22,860	15,866	41	23
Hot rolled black sheets	23,004	16,048	...	...
Cold reduced black sheets	2,750	2,750	...	...
Galvanized sheets	7,382	7,150	...	...
Steel castings—made by ingot makers	2,132	2,047	87	60
—made by other foundries	4,609	4,419	1,790	1,459
All other shapes, including tin plate, tinmill blackplate, cold finished bars and strips, etc.	29,374	16,094	170	196
Total	248,059	175,536	8,913	8,646

TABLE II

Carbon and Alloy Steel Shipments by Industries

Industry	Carbon Steel	Alloy Steel
Automotive industries	6,249	4,216
Agricultural, including farm machinery	9,384	39
Building construction	19,993	22
Containers' industry	11,610	1
Machinery and tools	12,928	572
Merchant trade products	20,829	174
Mining, lumbering, etc.	7,102	584
National defense	102	2
Pressing, forming and stamping	9,613	41
Public works and utilities	1,150	58
Railway operating	22,536	138
Railway cars and locomotives	14,255	78
Shipbuilding	3,073	26
Miscellaneous and unclassified	1,369	117
Wholesalers and warehouses	28,022	159
Direct export (a) to British Empire	736	164
(b) to Other Countries	6,585	2,260
Total Shipped for Sale	175,536	8,646

California Scrap Men Select New Officers

Oakland, Calif.

• • • **Paul Learner** of The Learner Co., Alameda, Calif., was elected president of the Northern California chapter of the Institute of Scrap Iron & Steel Inc. Mr. Learner succeeds Marshall A. Shapiro, California Metals Co., Oakland.

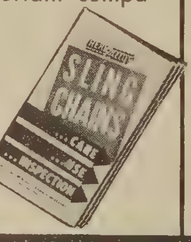
Other officers who were elected include: vice-president, Frank Malley, Associated Iron & Metal Co., Oakland; secretary-treasurer, Harold Levin, Salco Iron & Metal Co., San Francisco.

The following were elected as members of the executive committee: Henry Levin, R. Levin Co., San Francisco; David Robbins, Robbins Metal Co., Oakland; Philip Scheibner, Associated Iron & Metal Co., Oakland; Marshall A. Shapiro, California Metals Co., Oakland.

CM
HERC-ALLOY
SLING CHAINS
You can see for yourself that they are safe.

● Just one of the big advantages of HERC-ALLOY Sling Chains is that you can determine their serviceability by a simple visual inspection.* Ordinary steel or iron chains, on the contrary, grow dangerously brittle with age... an insidious threat to the safety of men and materials. That's why more and more of the important companies are standardizing on HERC-ALLOY Sling Chains...because you can **see** for yourself that they're safe.

**Write for your copy of this new, informative booklet. No charge.*



HERC-ALLOY FEATURES

- America's *first* alloy steel sling chain...first to bear a serial number.
- *Every* CM HERC-ALLOY Sling Chain is alloy steel throughout...links, rings, hooks. There is only one grade...*the best.*
- Every chain is individually tested and accompanied by a certificate of registration.
- Links are side welded for maximum strength by patented INSWELL electric method.
- HERC-ALLOY Chains should never be annealed.
- HERC-ALLOY Chains are lighter...stronger... easier to handle...outlast ordinary chains 4 to 5 times...cost less on the job.

HERC-ALLOY...the chain you can *SEE* is safe

COLUMBUS-McKINNON
CHAIN CORPORATION
(Affiliated with Chisholm-Moore Hoist Corporation)
GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

Export of Installation Parts for Pumps Cut By OIT License Order

Washington

• • • **The Office of** International Trade has issued a clarifying order on exports of casing and oil-line pipe and seamless black pipe (except casing, oil-line and boiler). The order concerns export of these commodities as part of pump installations.

A maximum of 250 ft pipe or casing may be exported under general license as part of pump installations, regardless of pump capacity. Quantities of pipe or casing exceeding this amount, shipped as pump installation parts, require validated licenses for export.

Reason for the OIT action is the fact that in the past considerable quantities of pipe or casing have been exported under general license as pump installation parts. In view of the critical shortage of these items, OIT deemed it necessary to limit the quantity that may be exported under general license as pump installation parts.

Bureau Finds Western Manganese Ores Usable

Washington

• • • **Studies of western** low-grade manganese ores indicate that 104 of the 288 samples analyzed could be used in the production of high-grade manganese, according to a new Bureau of Mines report, "Beneficiation of Western Manganese Ores."

The bureau says that only 47 samples proved valueless because of their low grade or chemical or physical nature. The samples were taken from 12 states—Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington and Wyoming—over a period of six years.

A total of 137 other samples could be treated to meet low-grade ore specifications, either for direct emergency use or later metallurgical processing, according to the bureau study. The remaining 47 samples could not be concentrated by ore-dressing methods.

Manganese ores ranging from

4 to 47 pct manganese were used in the bureau's studies, and each ore was tested by at least two methods—gravity and flotation. Frequently all known ore-dressing methods or combinations were tried.

The report, prepared by C. H. Schack and H. G. Poole, may be obtained from the Bureau of Mines, 4800 Forbes St., Pittsburgh, Pa.

Oliver Iron & Steel Holds "Family Night"; 3500 Visitors Attend

Pittsburgh

• • • **Planning an "open house"** is usually a long range organizing job, but Oliver Iron & Steel executives prove it can be done in 3 weeks. Recently the company played host to its employees and their families, with total visitors estimated at 3500 for the two "family nights."

Oliver employs about 1700 men and women in a plant covering over 585,000 sq ft and running to 3 floors in the main building. Despite only 3 weeks for cleanup and layout there were no bottlenecks on the tour. Thousands of feet of rope were laid out to guide the curious, while guides in each department explained operations and showed finished products. Simple stands using concrete building block bases supported the rope. All hazardous areas, including railroad tracks, were bridged.

Theodore F. Smith, company president, and his wife, personally greeted each guest on a receiving line at the main entrance. There was some question in the minds of the industrial engineering department as to the extent to which production would suffer from the curious. Observers believed however that many departments would set new all-time records, a phenomena frequently associated with such affairs.

This was the first time the 84-year-old company had invited its employees and their friends to see what each employee does in relation to the whole operation. Comments indicated that the two evenings were very successful in giving workers a better picture of their jobs.

READY-POWER means constant power

Ready-Power-equipped Baker Industrial Fork Truck

FOR ELECTRIC TRUCK OPERATION AT ITS BEST

The *maximum performance* of any electric truck can be maintained *indefinitely* when it is equipped with Ready-Power. These complete, compact power units provide constant, dependable power generated right on the truck chassis. Any electric truck can be converted to Ready-Power. Manufacturers will equip trucks with Ready-Power at your request.

Ready-Power-equipped Elwell-Parker stacking merchandise

THE READY-POWER CO.

3820 Grand River Ave., Detroit 8, Michigan

See Ready-Power Units on display at the Second National Material Handling Show Booth 401

Awards Announced In Lincoln Foundations' Arc Welding Contest

Cleveland

• • • The trustees of The James F. Lincoln Arc Welding Foundation have announced the awards in its $200,000 Design-For-Progress program. The 467 awards range from $100 for honorable mention to $13,200 for the main award.

The first main award of $13,200 was divided among Mr. Paul F. Hackethal, chief engineer, Mr. Clarence C. Mast, shop superintendent and Mr. Douglas W. Hamilton, welding foreman, all of the Koppers Co., aeromatic propeller department, Baltimore, for their coauthorship of a paper entered in the aircraft classification.

Their paper described how welded design of a variable pitch propeller hub for light planes overcame the problems presented by low cost manufacture and strength requirements to withstand repeated loads of thrust torque, centrifugal pull and gyroscopic action. The propeller has brought new safety, economy and speed to light private planes.

The second main award of $10,700 was awarded to Mr. Kiser E. Dumbauld, design engineer, of the Bureau of Bridges of the Ohio State Highway Dept., for his paper in the Structural Building and Bridges Classification. His subject was the redesign to welded construction of three of Ohio's bridges.

The third main award of $8,200 went to Mr. G. J. Storatz, engineer in charge, the Heil Co., Milwaukee. His paper entered in the industry machinery classification described the redesign to welded construction of the company's trailbuilder.

The Lincoln Foundation was created in 1936. Its purpose, as stated in the deed of trust, "is to encourage and stimulate scientific interest in, and scientific study, research and education in respect of the development of arc welding."

PERFORATED METAL
INDUSTRIAL and
ORNAMENTAL

INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furniture, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns. H & K workmanship is unsurpassed.

Any Metal
Any Perforation

The Harrington & King Perforating Co.

5657 FILLMORE STREET, CHICAGO 44, ILL. Eastern Office: 114 Liberty Street, New York 6, N. Y.

Mission Will Attempt To Speed Return of Army Scrap from Germany

Washington

• • • A Commerce Dept. sponsored, industry-government, scrap mission will leave for Germany on Dec. 30 for a two month stay in an effort to speed up return of scrap from Germany.

Some of the members of the mission will view the project with some skepticism as the Army is already doing everything in its power to accumulate and make available scrap, and because the government's delay in putting into effect the recommendations of a similar mission in 1945 resulted in the loss of much scrap.

However, even skeptics admit the mission may have value in making clear the monumental nature of the problems involved.

The Army expects to have available some 275,000 tons of Army-generated scrap in the first half of 1948. The mission will investigate the problems involved in preparing and handling this scrap and will attempt to break the major bottlenecks, labor and equipment shortages.

A secondary objective will be to determine the possibility of returning war damage scrap, belonging to the Germans. The British estimate that 3.5 million tons of this scrap is available in the British-American zones.

The makeup of the mission is not yet completed. It will be headed by John Haynes, Assistant Director of the Office of Domestic Commerce. J. B. Andrews and C. B. Minnes will represent the American Iron and Steel Institute. The Institute of Scrap Iron and Steel will furnish two representatives and the foundry industry will furnish one man.

Government representation will include one man from the State Dept. and Lt. Col. S. M. Pool, the Army's overseas scrap expert.

A representative from Presidential Adviser Steelman's office is unlikely as Mr. Steelman is known to be skeptical of the effectiveness of such a project.

In Japan the Army reports difficulty in selling about 4000 to 5000 tons of prepared scrap, as American buyers have allegedly not been interested. Additional scrap will be available by spring as more Jap ships are cut up.

Meanwhile, The Iron Age has learned that Commerce's Office of International Trade is also planning a scrap mission to Europe. This mission, not connected with the December 30 party sponsored by the Office of Domestic Commerce, will attempt to discover sources of scrap in the 16 Marshall Plan countries so as to tone down the scrap demands made on the United States for the four-year program—totaling some 8,300,000 tons.

New Tariff Agreement Expected to Give U.S. More Canadian Copper

Toronto

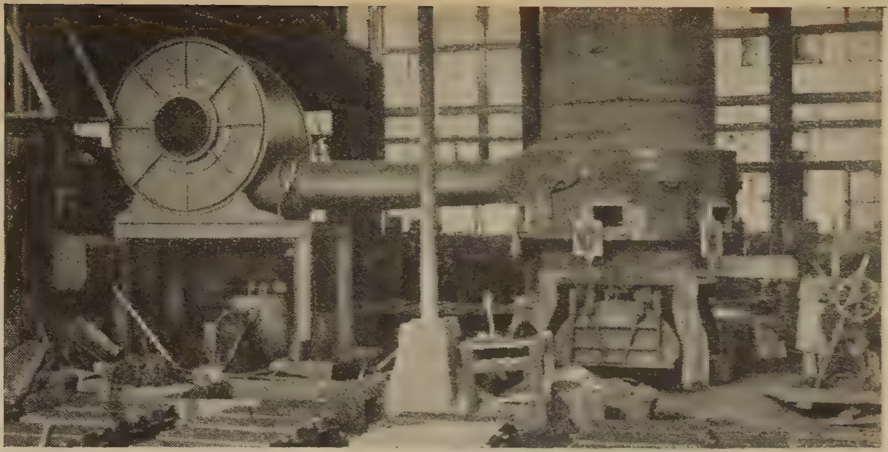
• • • **Canada is looking** forward to a sharp jump in exports of nonferrous metals to the United States during 1948 as a result of reduction of U. S. tariff on these materials. At the same time it is indicated there will be a large cut in exports from Canada to Great Britain.

From reliable sources it is learned that copper exports alone to the United States in 1948 may run as high as $20,000,000, while lead and zinc also will be stepped up substantially. However, the big increase in exports will depend largely on the willingness of the Canadian producers to provide the large additional tonnage.

This year Canada sold no copper to the States, as arrangements with the United Kingdom took practically all surplus stocks over domestic requirements. However, United Kingdom purchases will be curtailed next year and after supplying domestic needs, it is estimated that Canada will have a surplus of some 6000 tons monthly which can be sold in the States.

In so far as iron and steel are concerned, it is not expected that there will be any direct changes in either exports or imports as long as present conditions prevail regarding supply and demand in the domestic markets. With the heavy demand for steel prevailing in Canada, domestic production is meeting only about two-thirds deliveries, with most of the remainder being supplied by the United States.

Heads of Canadian steel companies decline to make predictions as to when supply and demand may be equalized.



One thing you can be sure of . . .

THE SPENCER FOUNDRY TURBO

For more than forty years foundrymen everywhere have relied on the performance of the Spencer Turbo Compressor.

The very simplicity of the centrifugal design, with wide clearances, only two bearings, and no special foundations is part of its answer. The Spencer Turbo is inherently ideal for foundries because the volume and weight of air can be controlled by hand or automatically.

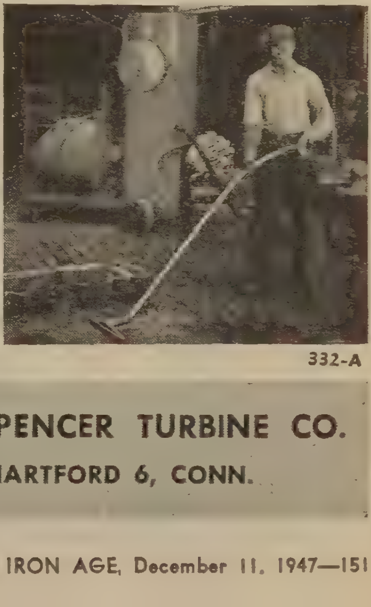
Air requirements for foundry cupolas are given in the Spencer Foundry Bulletin No. 112, and complete calculations for all Turbo applications including oil and gas-fired equipment are given in the Spencer Turbo Data Book No. 107.

AND SPENCER VACUUM CLEANING

Overhead dirt and dust are easily removed from pipes, windows, structures and walls with Spencer Portable or Stationary Vacuum Cleaning Systems. Also valuable for reclaiming sand, cleaning molds, patterns and machinery.

ASK FOR THESE SPENCER BULLETINS

No. 131	General Information
No. 116	Piping and Valves
No. 137	Boiler Cleaning
No. 102	Portable Vacuum Cleaners
No. 125	Central Vacuum Cleaners
No. 130	Sump Tank Cleaner
No. 143	Pneumatic Conveying
No. 142	Turbo-Agitation
No. 127	Turbo-Compressors
No. 109	Gas Boosters
No. 112	Foundry Blowers



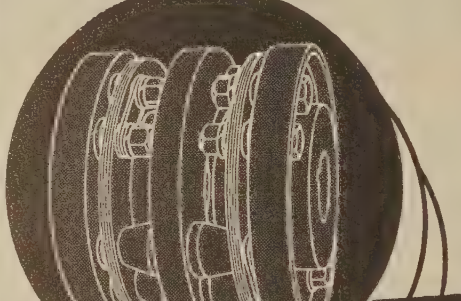
332-A

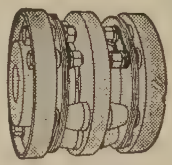
SPENCER
HARTFORD

THE SPENCER TURBINE CO.
HARTFORD 6, CONN.

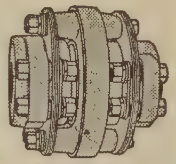
THOMAS *Flexible* COUPLINGS

are specified by engineers wherever 100% dependability is demanded

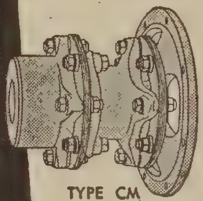




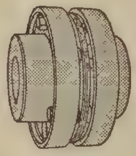
TYPE DBZ



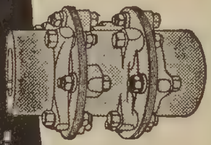
TYPE DSM



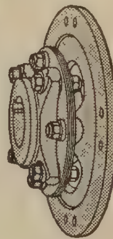
TYPE CM



TYPE ST



TYPE AM

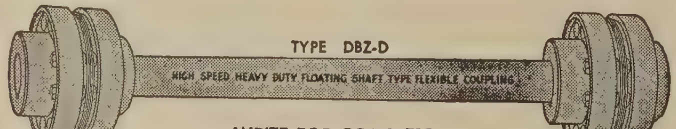


TYPE SS

THOMAS *Flexible* COUPLINGS provide for Angular and Parallel Misalignment as well as Free End Float . . . *and Eliminate* BACKLASH, FRICTION, WEAR and CROSS-PULL

NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.


TYPE DBZ-D
HIGH SPEED HEAVY DUTY FLOATING SHAFT TYPE FLEXIBLE COUPLING

WRITE FOR COMPLETE ENGINEERING CATALOG

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Company Heads Should Stress Worker Welfare Above Sales, Says Given

Pittsburgh

• • • **The chief duty** of a company's top executive officer is to concentrate on the employees and their needs, rather than on sales, manufacturing, finance, or any other company function. This is the opinion of William B. Given, Jr., president, American Brake Shoe Co., as expressed in the keynote speech, "A Better Place to Work," which he delivered at the Industrial Hygiene Foundation's 12th annual meeting at Mellon Institute recently.

"It is more important," Mr. Given said, "to know the company's people than to know its customers. In a list of employees' needs, good working conditions rank very high." And, if the head of a company is not found to be up to his job, the board of directors should remove him.

"Stockholders cannot long afford officers who do not realize the importance of top health and safety conditions in their company's plants," Mr. Given said, "nor managements which do not spend whatever money is necessary to give plant people the maximum of health and safety assurance."

In making his point, Mr. Given drew on his experiences in the American Brake Shoe Co., which had a safety department and a safety program for years. But the emphasis, he said, was always put on cost and on the reduction of the monthly reserve for accident insurance, which would improve prospects for profits.

"Top management was interested in its people," he said, "but the drive on plant supervision was in terms of plant costs, not in terms of humanities. Plants were full of unnecessary hazards, and the overall record was bad."

Industrial hygiene, he continued, has up to recently been years behind medicine, and while the distance between them has been greatly shortened, industry is still lagging. "Our failures," he said, "have been and still are due to management weaknesses, whereas our successes have come in the main from the medical department's successes in its fight for proper recognition of medical facts and the need for medical safeguards.

"Planning safety and health, and making it function effectively, is one of the great challenges to management. One of the short cuts to such functioning is the selection of a qualified medical director.

The American Brake Shoe Co., of which Mr. Given is president, has 60 plants, of which 42 are foundries. Management problems are accordingly multiplied to an unusual degree, he stated.

For example, if Brake Shoe's industrial hygiene program is to succeed, 42 foundry superintendents must be made dust-conscious, and must sincerely believe that safer working conditions warrant higher costs, if higher costs are inescapable. Any amount of expense which makes a plant safer is a good investment.

"There must be at the top," he continued, "a willingness to spend generously for safety. In the old days, when a capital expense was recommended, directors would ask: 'Will this reduce costs?' or 'Will it increase capacity?' Today the attitude is different. We know there are many capital expenditures we cannot afford not to make, although of themselves they neither reduce costs nor increase production.

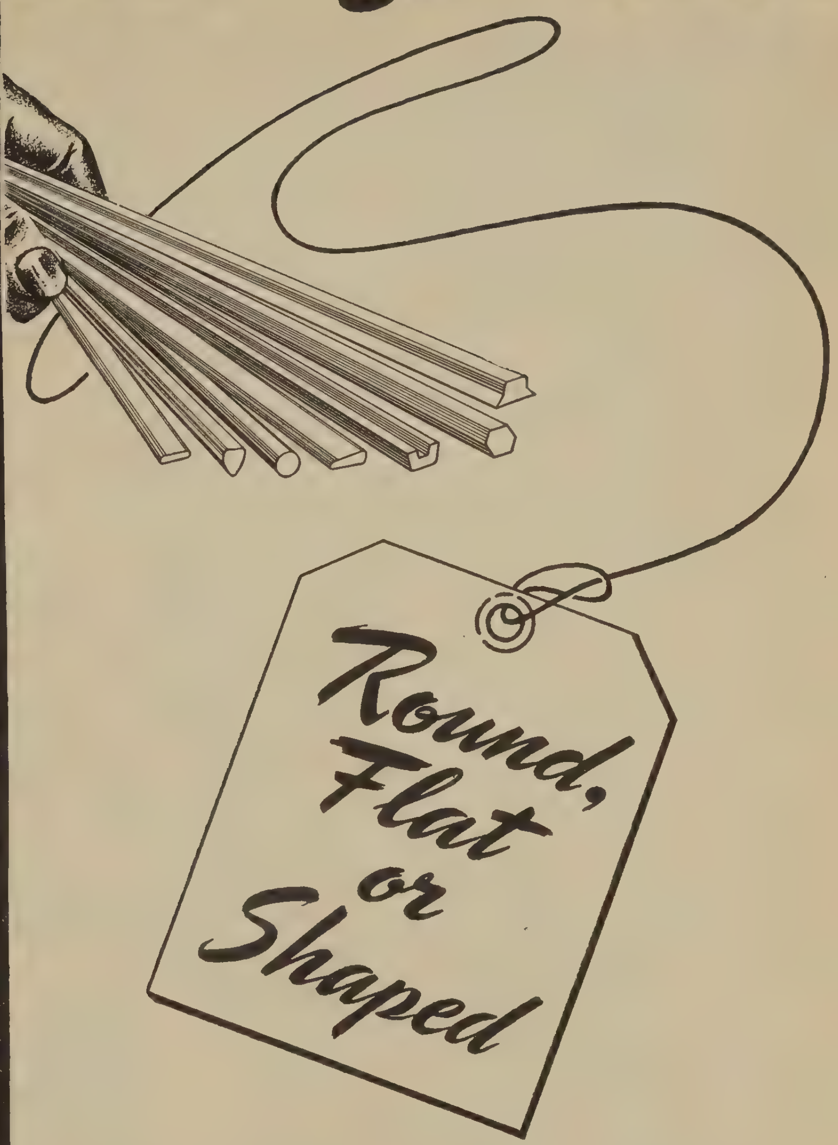
"**We must build** our human relations on the basis of a debt our company owes to the people who make its success. This indebtedness is definite. It must and can be met." Selling the importance of an industrial hygiene plan to the supervising force is one of the toughest jobs in industry, Mr. Given said:

"To succeed here requires toughness all the way up the management line of authority. We believe we owe it to our people to be as tough as necessary."

"There is no greater waste of material than an able medical head in a company where the tops have the right 'patter' and the wrong hearts. Actually, the executive who isn't deeply interested in eliminating all hazards does not qualify otherwise in this period when human relations are at last getting the recognition due them."

Other speakers on the program included Sumner Pike, a member of the U. S. Atomic Energy Commission, who described atomic developments to date and how indus-

PAGE *Stainless Steel* WIRE



● It isn't boasting to say that we really know something about stainless steel wire. Wire has always been the business of PAGE. And stainless steel wire has been a PAGE specialty almost since the introduction of stainless.

PAGE offers you a responsible source for wire and information about its use in production. High and low carbon steel, Armco iron as well as various analyses of stainless. Get in touch with PAGE.

ACCO Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

TEMPIL°

measures working temperatures

. . . QUICKLY

. . . SIMPLY

. . . ACCURATELY

• MELTS SHARPLY — Tempil° products have a sharp and rapid melting action at stated temperatures . . . are available in *liquid, crayon,* or *pellet* form, as a convenient means of signalling temperatures in a multitude of industrial operations.

• READILY IDENTIFIED — Each Tempil° product is clearly marked with the temperature at which it melts. In addition, Tempil° products are made in a *distinguishing* color for each melting point.

• ACCURACY — Tempil° products have a mean accuracy of within 1% of stated temperature.

• USES — Tempil° products are widely used to: prevent cracks and failures in metal processing; make stronger and safer welds; repair costly castings, forgings and machine equipment; in hard-surfacing, straightening hardened parts, drawing, tempering and local heat-treating.

TEMPILAQ

TEMPILSTIK° In 13° steps . . . 125° F. to 400° F. In 50° steps . . . 400° F. to 1600° F. For welding, forging, heat-treating and fabrication of metals; molding of glass, rubber and plastics, etc.

TEMPIL° PELLETS In 25° steps . . . 125° F. to 350° F. In 50° steps . . . 400° F. to 1700° F. To determine temperatures in heat-treating of large units or extensive areas; checking furnace or engine temperatures; setting induction-heater timers, etc.

TEMPILAQ° In 25° steps . . . 125° F. to 350° F. In 50° steps . . . 400° F. to 1700° F. For heat-treating or processing, particularly on interiors not accessible for Tempilstiks° or Pellets; ideal for glazed or polished surfaces, glass, plastics, etc.

Write Gordon today for Tempil° Preheating Chart, Tempil° scale for weld bend testing and complete information on Tempil° products.

GORDON SERVICE

CLAUD S. GORDON CO.

Specialists for 33 Years in the Heat-Treating and Temperature Control Field

Dept. 16 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 16 • 7016 Euclid Avenue • Cleveland 3, Ohio

try will benefit by them as soon as they are commercially available.

J. Stevens Stock, senior member of the Opinion Research Corp., spoke on the attitude of communities on working conditions, and how this attitude affects the employees.

Dr. H. A. Vonachen, medical director, Caterpillar Tractor Co., described the manner in which his company carries out a wide industrial hygiene program.

Dr. J. J. Wittmer, assistant vice-president of the Consolidated Edison Co., made an appraisal of cash sickness benefits, of those that are already in force and those that are being contemplated in several states. V. P. Ahearn, executive secretary of the National Industrial Sand Assn., spoke on the establishment of health and welfare funds under the Taft-Hartley act, and the probable effects of legislation on the funds which have been receiving increased attention in union contract negotiations.

October Export For Canada Shows Sharp Jump Over September

Ottawa

• • • **Canada's export** trade registered a sharp jump in October to a total value of $250 million. This figure was the third highest monthly total in the post-war period being exceeded only by May and June of this year, and was 14.7 pct over September's total of $218.6 million, and a gain of 22.8 pct over the $204.2 million for October last year.

Exports to the United States rose to $102,443,000 in October this year against $99,086,000 in the same month of 1946, while shipments to empire countries totalled $104.5 million in the month under review against $71.6 million in the same month last year. To the United Kingdom, Canadian exports totalled $66,776,000 compared with $47,665,000 in October 1946. Shipments to France were valued at $9,928,000 compared with $5,079,000 last year and to the Latin-American countries exports in October totalled $8,856,000.

A feature of Canada's exports for October was the advance in wood and paper products which rose from $62,940,000 in October last year to $90,067,000 this year. In the iron and steel group which rose from $10,658,000 in October 1946 to $23,352,000 this year, the largest gains were recorded for farm implements and machinery

30 TON THRILLER: *The Gyro-Spin, newest and most spectacular amusement park ride, is a 50 ft globe that operates like a gyroscope. Of arc welded construction, the globe revolves horizontally at 20 rpm, at the same time the outer ring tilts to right and left, producing an illusion of still greater speed and the sensation of falling.*

and other machinery, automobiles and parts.

The non-ferrous metal group advanced from $14,030,000 to $26,435,000 in October this year, with aluminum products, copper products, lead products, nickel and zinc products showing the largest gains. The non-metallic minerals group advanced from $5,337,000 to $7,449,000 in October this year, while chemicals and their products rose from $5,780,000 to $7,078,000. The main decreases in exports were in wheat and other grains.

Reeve Hoover Will Head Kyanite Development Co.

• • • The board of directors of Commercialores, Inc., has elected Reeve Hoover, Washington, D. C., as its chairman, the company has announced.

Commercialores, Inc., was established last March by a private group, for the purpose of developing a large kyanite deposit in South Carolina. Kyanite is a silicate of alumina widely used in super-duty refractories and in other branches of the ceramic industry. Satisfactory progress has been made in building a sizeable plant at the mine site, near Clover, S. C., the company reported.

Henry S. Doty, formerly manager of the Kyanite Products Corporation is president of Commercialores, Inc.; L. G. Wilson is vice president and treasurer, and N. K. Karchner is vice president in charge of production.

Directors of the corporation, aside from Mr. Hoover, who is vice president of Dominion Minerals, Inc., are Clyde Williams of Cincinnati, Mr. Doty, Albert R. Eckel of the Chilton Company, and Godfrey S. Rockefeller, George Percy and Richard E. Metz, all of Clark Dodge & Co., New York investment bankers.

Danube-Oder Link Planned

London

• • • The Danube-Oder Canal, construction of which is provided for under a Polish-Czechoslovakian agreement, will be 146 miles long and will have 32 locks. Completion of the digging is expected to take 2 years and the construction itself is estimated to last for 6 years, employing 25,000 people. The cost is estimated at about $650 million.

SPECIAL SERVICE RENDERED by PERKINS

While we are most widely known for our ability to meet practically any demands for the mass production and prompt delivery of precision, custom-cut gears, our extensive facilities and modern machine tools are also adaptable to the manufacture of all kinds of various parts other than gears, such as the following:

SPROCKETS • SPLINED SHAFTS
SCREW MACHINE PARTS
up to 2¼" in diameter

We are also exceptionally well equipped to build, to your specifications, such mechanical units as—

PUMPS • SPEED REDUCERS
& COMPLETE MACHINES

either in experimental or production quantities. Our well-known reputation is your guarantee of satisfaction. Let us quote on your requirements.

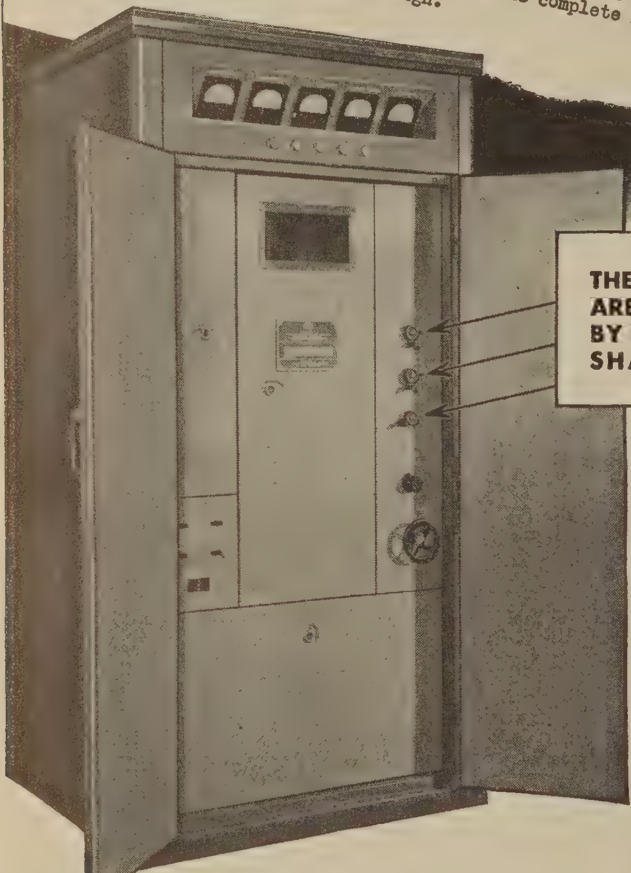
•

PERKINS MAKES—in all materials, metallic and non-metallic—Helical Gears, Bevel Gears, Ratchets, Worm Gears, Spiral Gears, Spur Gears with shaved or ground teeth, Ground Thread Worms

PERKINS MACHINE & GEAR CO.
Springfield 2, Massachusetts

THE *Project Engineer* TELLS WHY
S.S.WHITE FLEXIBLE SHAFTS
ARE USED IN THIS F-M TRANSMITTER

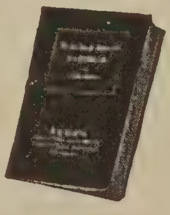
In high frequency radio transmitting equipment, various variable elements must be strategetically located for premium electrical performance. In most cases, the resultant mechanical placement of these various elements do not readily adapt themselves to a symetrical front panel placement of control knobs. Various methods of pulley and chain drive arrangements result in stiff operation with intolerable back-lash. For these reasons we have selected S.S.White flexible control shafts to allow us complete freedom in our mechanical and electrical design.



THESE 3 CONTROLS ARE OPERATED BY FLEXIBLE SHAFTS

Photo courtesy of Radio Engineering Laboratories, Inc Long Island City, N.Y

This statement by the project engineer of Radio Engineering Laboratories, Inc., hits the nail on the head. The use of S.S.White remote control flexible shafts to couple variable units to their control knobs, eliminates all problems of knob and unit placement. Furthermore, these shafts when properly applied, give a quality of control that is as smooth and sensitive as a direct connection. Full details of these shafts and their application are given in the 260-page FLEXIBLE SHAFT HANDBOOK. A request direct to us on your business letterhead, indicating your position, will bring you a free copy. Write for it today.



S.S.WHITE INDUSTRIAL DIVISION
THE S. S. WHITE DENTAL MFG. CO.
DEPT. I 10 EAST 40th ST., NEW YORK 16, N. Y.
FLEXIBLE SHAFTS • FLEXIBLE SHAFT TOOLS • AIRCRAFT ACCESSORIES
SMALL CUTTING AND GRINDING TOOLS • SPECIAL FORMULA RUBBERS
MOLDED RESISTORS • PLASTIC SPECIALTIES • CONTRACT PLASTICS MOLDING

One of America's AAAA Industrial Enterprises

British Survey Shows Sweden Making More Heavy Rolled Products

London

• • • A survey in the British Iron & Steel Federation's monthly statistical bulletin draws attention to the tendency of Sweden, a traditional producer of iron ore, high grade steel and specialized products, to enter to an increasing extent into the field of heavy rolled products for which she has normally relied on imports.

Wartime increases in Central Sweden's capacity for making ordinary steel, coupled with the plans for expansion of coke, pig iron, steelmaking and heavy rolling facilities at the Norrbotten plant near the Lapland ore fields, make the long term position for United Kingdom exports of heavy steel uncertain. Moreover, when the latest expansions to the Norrbotten plant were discussed in the Swedish Parliament, an export surplus of Swedish ordinary grade heavy rolled was foreseen.

Nevertheless, in view of Sweden's accumulated sterling balances totaling some £25 millions ($100 million), and of her considerable arrears of imports still to be made up, the short term outlook for U.K. exports is favorable.

The federation survey stresses the growing difficulty experienced by the central Swedish industry in obtaining sufficient supplies of charcoal for pig iron making, and forecasts that within a few years, many steelmakers will be changing over partly or wholly to sponge iron as a basis for their high grade steel production, as this process, in combination with the exceptionally pure and rich Swedish ores, is more economical in charcoal consumption. An interesting review is given of the various sponge iron processes which have been developed to the commercial stage.

The rising cost of charcoal, coupled with the high cost of fuel generally, is one of the reasons for the present Swedish price level, whether for ordinary or quality steels, being above that ruling in either the United Kingdom or the United States. The high price of Swedish ball bearing steel, for instance, was responsible for the recent temporary suspension of exports of this material to the U. S.

United Kingdom Exports For October Approach July's Record Levels

London

• • • **Exports of United** Kingdom goods in October amounted to $432.8 million. This exceeded the September figure by $36.8 million, but is $8.4 million below the peak figure for July. The latter month, in fact, forms the better basis for comparison of exports both because July and October had the same number of working days (27) and because the holiday season renders any comparison with either August or September unrealistic.

The daily rate in October was, apart from July, higher than in any month since the war. If 26 days (excluding Sundays) are taken as a normal working month, exports during the last nine months have been, in millions of dollars: February, 330; March, 330; April, 358; May, 358; June, 404; July, 424; August, 388; September, 396; and October, 416.

The volume of exports in October is provisionally estimated at 20 pct higher than in 1938, compared with 26 pct in July, and 14 pct in the third quarter, which was, of course, affected by the holiday period.

Exports by UNRRA included in the October total amounted to $5.2 million compared with $7.6 million in July and those by NAAFI were $3.6 million as against $3.2 million in July. Excluding shipments by UNRRA and NAAFI, therefore, the value of exports in October was $424.4 million, the corresponding figure for July being $430.8 million.

There was a drop in value for each of the main classes exported compared with July, though in the case of manufactured goods the fall was relatively small. The proportion of total exports represented by machinery and vehicles rose to one third, which was entirely due to a sharp rise from $10.8 million to $77.6 million in the value of the vehicles exported, this being much the highest figure on record, whereas machinery fell by $2 million to $67.2 million. For the first ten months of this year, however, exports of machinery amounted to $584.8, which is $37.2 million more

footnote on good shop-keeping

* If you want to keep your shop looking clean, start from the floor up. Use Wyandotte Zorball, the *all-purpose* floor absorbent, to remove oil, grease and other liquids quickly and efficiently.

Zorball gives an immediate antiskid surface to soiled floors, thus reducing the danger of slipping accidents. And it is nonflammable. Even when soaked with oil, it will not readily support combustion.

Another important advantage of Zorball is that it's thoroughly safe. It is harmless to fabrics, metals and rubber, and will not irritate the skin of those who handle it.

Your Wyandotte Representative will be glad to demonstrate the effectiveness and economy of Wyandotte Zorball at your convenience. Why not give him a call today?

Wyandotte
REG. U. S. PAT. OFF.

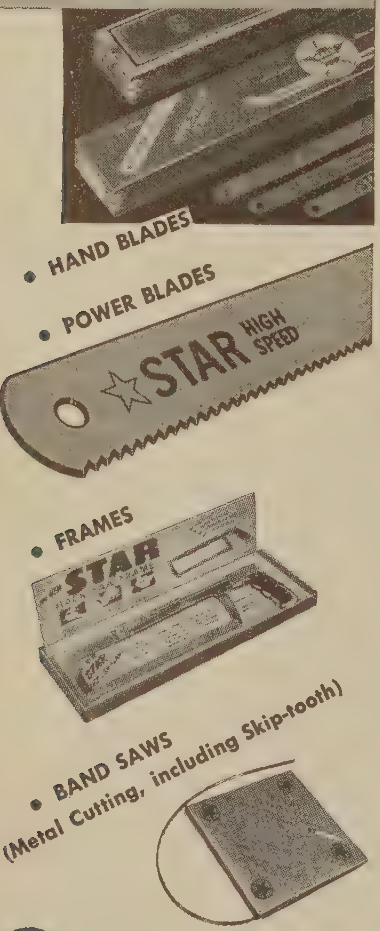
WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • SERVICE REPRESENTATIVES IN 88 CITIES

the right line
for
the right blade

THE Star line is the right line because it's *really complete*. At your Star supplier you'll find a blade for every job a hack saw or band saw can do. In addition, you'll get the *right* blade because your Star supplier is backed by *a complete line* of blades that have *proved faster, longer wearing,* in cutting metals, plastics, and other non-metallics. So, add it up any way you like, Star blades, frames and band saws, amount to *more* economy, *more* convenience, and *more* satisfaction. Yes, you can't go wrong when you see your Star supplier — he has the right line, the right saw *for you*. It's Star.

This booklet is packed with facts on saw selection, use, care — prices, too. Get your copy from your Star supplier . . . free.

METAL CUTTING
Star



Sold only through recognized distributors

CLEMSON

CLEMSON BROS., Inc., Middletown, N. Y.
Makers of hand and power hack saw blades, frames, metal cutting band saw blades and the Clemson E-17 lawn machine.

than the value of vehicles so far exported.

Most of the rise over July in the vehicles group was due to an increase from $7.2 million to $17.6 in the value of ships and boats exported, the tonnage (51,700) being the highest since December, 1930. While exports of ships and boats are particularly liable to marked month-to-month fluctuations, it is noteworthy that exports have been rising and last month's figures exceed those in the whole of the third quarter or the 1938 quarterly average. Exports of motor cars also rose by $3.2 million compared with July, the value exceeding $16 million for the first time; the number (14,186) showed an advance of 1604 over the record figure for September. Miscellaneous manufactures were $6.4 million less than in July, but otherwise the highest since October last year. Chemicals were $4 million lower and manufactures of iron and steel $2.4 million lower.

Orders Walking Dragline

London

• • • **Ransomes & Rapier, Ltd.**, of Ipswich, have received an order from Stewarts & Lloyds, Ltd., for what is claimed will be the biggest walking dragline in the world. It will be used for removing the overburden in the strip mining of iron ore in England.

The dragline will weigh 1500 long tons, will have a bucket capacity of 20 cu yd with a boom length of 282 ft, and will be driven by two electric generator sets each of 1500 hp. Digging and walking controls will be handled by one man. The boom head will be 175 ft above ground level and when slewing will travel at 2000 ft per min.

Atomic Funds Granted

Stockholm

• • • **The Swedish government** recently granted a little over half a million kroner ($139,000) for atomic energy research in Sweden. The sum was distributed to several scientists and institutions working on nuclear physics and chemistry. The biggest grant, 200,000 kroner, was made to Prof. The Svedberg for the cyclotron which is being built at his Upsala laboratory.

ThredKut*
INCREASED OUTPUT 4 to 1

. . . reports
JOHN L. MOROSINI
D. A. Stuart Oil Co.
Representative

"Prior to using THREDKUT,* this customer had tried several types of cutting oil in tapping 1½" dia. x 1" holes in very tough cast steel, with a maximum production of 50 tapped holes before sharpening was necessary. On switching to THREDKUT,* output immediately increased to 200 tapped holes between sharpenings. Here is another instance where THREDKUT* demonstrated its well-established reputation for licking a tough job."

. . John L. Morosini

ThredKut *

. . . Stuart's THREDKUT is a unique cutting oil carefully manufactured to insure the maximum benefits from controlled chemical activity. Its outstanding performance on really tough jobs has long been recognized and its flexibility proved through exceedingly widespread use. The many time-tested values built into THREDKUT are serving the leaders of the metal-working industry, increasing efficiency and reducing costs.

Ask to have a Stuart Service Engineer discuss your cutting fluid requirements. THREDKUT literature available on request.

STUART service goes with every barrel

WRITE FOR DETAILS

D.A. Stuart Oil CO.
LIMITED

2737 SOUTH TROY STREET, CHICAGO 23, ILL

Cold Strip Mill Planned By Australian Company

London

• • • **A new four-high** reversing cold strip mill has been planned for erection at Port Kembla, N.S.W., Australia. The manufacture of the mechanical equipment is to be divided between Sheffield (England), and Australia, the plant being designed by the Davy & United Engineering Co., Ltd., of Sheffield. It is hoped that the mill will be producing sheet by 1949 and strip by 1950 at the works of Commonwealth Rolling Mills Proprietary, Ltd., a subsidiary of John Lysaght, Ltd. (Australia).

The plant is designed for rolling strip in coils up to 10 long tons in weight, and for single sheet working. The work rolls are 20½-in. diam, with back-up rolls of 53-in. diam. The barrel length is 80 in. A direct-coupled 2500-hp motor powers the main mill drive, while two motors of 500 hp will drive two cold strip reels.

The mill is to be equipped with removable ingoing and outgoing tables for sheets, and an ingoing uncoiler for coils. Back-up rolls will have Morgoil bearings, with roller bearings on the work rolls. The top roll balance gear is hydraulic. Two-motor type screwdown gear is to be fitted, and independent operation of each screw will be via magnetic clutch. The electrical equipment is to be made by the Metropolitan-Vickers Electrical Co., Ltd.

Sydney to Build Dam

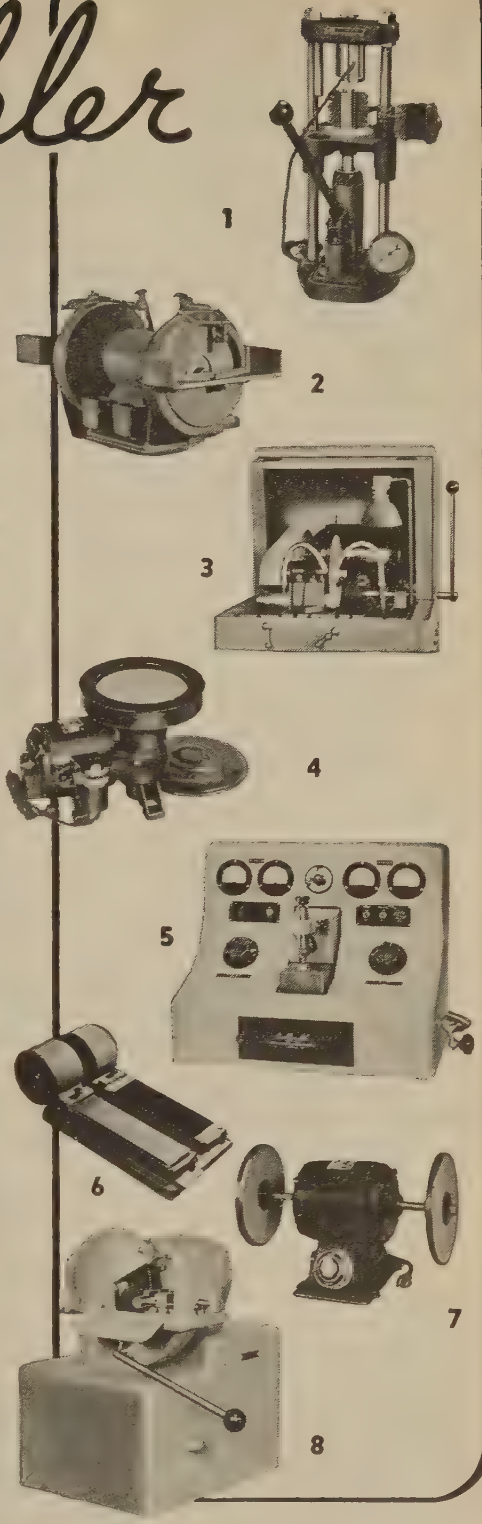
London

• • • **The City of Sydney,** Australia, is to build a dam across the Nepean River at Warragamba to insure its future water supply. 2½ million cu yd of concrete will be required and to convey this and other materials, the British Ropeway Engineering Co., of London, in association with the Perry Engineering Co. of Adelaide, will supply an aerial ropeway at a cost of $1,600,000.

Items of the ropeway contract, which was open to world competition are 200 steel trestles, 10 bridges to protect road crossings, and 550 conveying trucks each holding 3090 lb to carry 190 tons per hour.

Buehler

Offers a Complete Line of Equipment for the . . . METALLURGICAL LABORATORY



Buehler specimen preparation equipment is designed especially for the metallurgist, and is built with a high degree of precision and accuracy for the fast production of the finest quality of metallurgical specimens.

1. No. 1315 Press for the rapid moulding of specimen mounts, either bakelite or transparent plastic. Heating element can be raised and cooling blocks swung into position without releasing pressure on the mold.

2. No. 1210 Wet power grinder with ¾" hp. ball bearing motor totally enclosed. Has two 12" wheels mounted on metal plates for coarse and medium grinding.

3. No. 1000 Cut-off machine is a heavy duty cutter for stock up to 3½". Powered with a 3 hp. totally enclosed motor with cut-off wheel, 12" x 3/32" x 1-1/4".

4. 1505-2AB Low Speed Polisher complete with 8" balanced bronze polishing disc. Mounted to ¼ hp. ball bearing, two speed motor, with right angle gear reduction for 161 and 246 R.P.M. spindle speeds.

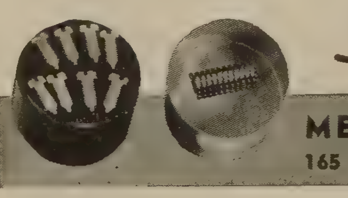
5. No. 1700 New Buehler-Waisman Electro Polisher produces scratch-free specimens in a fraction of the time usually required for polishing. Speed with dependable results is obtained with both ferrous and non-ferrous samples. Simple to operate—does not require an expert technician to produce good specimens.

6. No 1410 Hand Grinder conveniently arranged for two stage grinding with medium and fine emery paper on twin grinding surfaces. A reserve supply of 150 ft. of abrasive paper is contained in rolls and can be quickly drawn into position for use.

7. No. 1400 Emery paper disc grinder. Four grades of abrasive paper are provided for grinding on the four sides of discs, 8" in diameter. Motor 1/3 hp. with two speeds, 575 and 1150 R.P.M.

8. No. 1015 Cut-off machine for table mounting with separate unit recirculating cooling system No. 1016. Motor 1 hp. with capacity for cutting 1" stock.

The Buehler Line of Specimen Preparation Equipment includes . . . Cut-off Machines • Specimen Mount Presses • Power Grinders • Emery Paper Grinders • Hand Grinders • Belt Surfacers • Mechanical and Electro Polishers • Polishing Cloths • Polishing Abrasives.



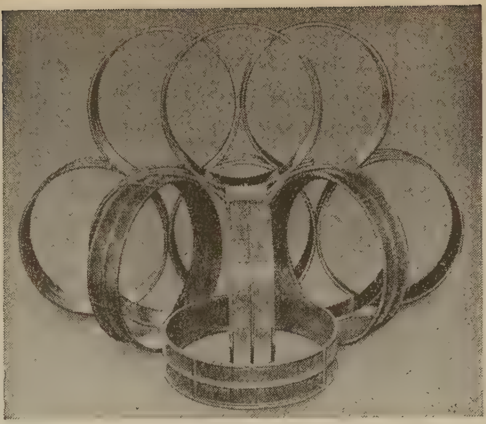
Buehler Ltd.
A PARTNERSHIP

METALLURGICAL APPARATUS
165 WEST WACKER DRIVE, CHICAGO 1, ILLINOIS

Typical

of

HENDRICK
WORKMANSHIP



These milled-slot screens, for centrifugal drying of various materials, are made of 1/8″ stainless steel, and in their fabrication tolerances as close as plus or minus .0001″ were maintained; an illustration of Hendrick's expert workmanship.

Hendrick offers unusual facilities for the manufacturing of many specialized products, of which these screens are a typical example. Write for detailed information.

SEE OUR CATALOG IN SWEET'S

Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids

HENDRICK
Manufacturing Company
37 DUNDAFF STREET, CARBONDALE, PENNA.
Sales Offices In Principal Cities

ROUSTABOUT CRANES

. . . offer you safety, speed and low costs not possible with out-of-date man-handling methods

● Avoid strains and injuries and the dangers and high costs of a cluttered disorganized yard by modernizing your outdoor materials handling with these rugged mobile Roustabouts. Flexible performance—fast action with hook or magnet, loads to 7½ tons—built for years of overwork, as hundreds of users can tell you. Write for the money-saving facts . . . *today!*

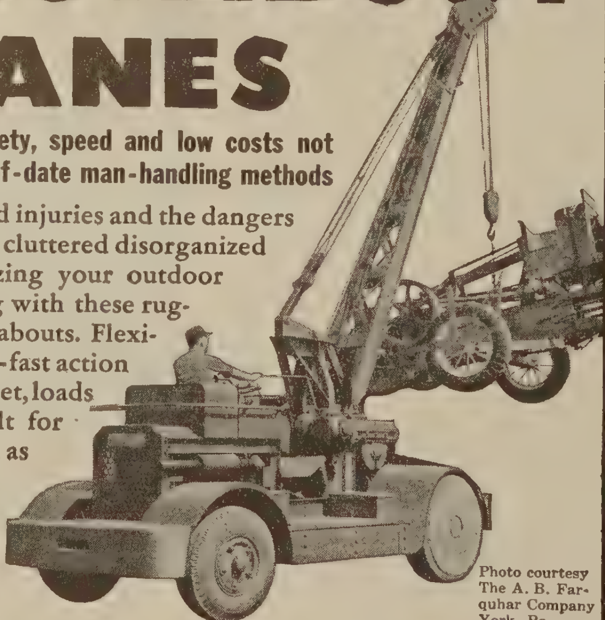


Photo courtesy The A. B. Farquhar Company York, Pa.

ROUSTABOUT CRANE

THE HUGHES-KEENAN COMPANY
571 NEWMAN STREET • MANSFIELD, OHIO

Roustabout Cranes
By Hughes-Keenan

Load-Handling Specialists Since 1904

More Pig Iron Held Essential in British Reconstruction Plans

London

• • • **The British iron** and steel industry's reconstruction plans formed the basis of an address given at Middlesbrough recently by Dr. T. P. Colclough, scientific adviser to the Iron & Steel Board.

Dr. Colclough said that in 1937, British production of 13 million long tons of steel was 1.7 million long tons short of home and export requirements and the gap had to be filled by imports. 1937 represented the peak of prewar production.

The 1952 target output of 16 million long tons of steel ingots and castings can only be achieved by replacing as much of the existing obsolete plant by modern efficient units as engineering capacity and manpower will permit. To reach this steel-producing goal there will be required over 12 million long tons of pig iron, compared with the previous best prewar output (in 1937) of 8.25 million long tons.

To meet the increased demand for steel making iron, it is proposed to erect new blast furnaces with a total capacity of 4.75 million long tons a year and to scrap about 3 million long tons of present capacity. The reconstruction plan envisages the scrapping of 53 blast furnaces with an average production of 57,000 long tons a year and replacing these by 24 modern furnaces. The fulfillment of this program will permit the production of about 8.8 million long tons of steel making iron and hematite in 29 fewer furnaces.

Approval has been given for the building of 8 large furnaces with a combined capacity of over 2 million long tons of iron; 3 in the North-East of England, 3 in Lincolnshire and 2 in South Wales. It is also proposed to build new openhearth steel furnaces with a capacity of nearly 6 million long tons of ingots and to scrap about 4 million long tons, nearly 30 pct, of the present capacity.

Awards Conferred By American Society Of Mechanical Engineers

Atlantic City, N. J.

• • • **The American Society** of Mechanical Engineers recently announced the winners of its 1947 honors and awards for distinguished work in engineering and other fields.

Honorary memberships were conferred on:

Dr. Harvey N. Davis, president of Stevens Institute of Technology, Hoboken, for his "distinguished career as scientist, engineer and educator."

Dr. Francis Hodgkinson, 80-year-old honorary professor of mechanical engineering of Columbia University and retired consulting engineer of Westinghouse Electric Corp., for his pioneer work and "outstanding achievement in the development of the steam turbine prime mover."

Everett G. Ackart, chief engineer of E. I. du Pont de Nemours Co., Wilmington, Del., from 1927 to 1946, for "a successful career of 40 years in designing industrial steam plants."

Among the medals conferred were:

The Melville Medal to Dr. Raymond C. Martinelli, associate professor of mechanical engineering, University of Calif., Los Angeles, for his paper, "Heat Transfer to Molten Metals."

The Richards Memorial Award to Dr. Jacob P. Den Hartog, native of the Dutch East Indies, professor in the dept. of mechanical engineering, Massachusetts Institute of Technology, for "outstanding work in applied mechanics."

The Pi Tau Sigma Medal to David Cochran, General Electric Co., Schenectady, a div. engineer engaged in the company's work for the U. S. Atomic Energy Commission, for "outstanding mechanical engineering work within 10 years of date of graduation." He was graduated from Montana State College in 1938.

The Undergraduate Student Award went to William R. Collier, of Lynn, Mass., 25-year-old war veteran, a senior at Tufts College Engineering School, for his paper, "Corrosion—A Design Problem."

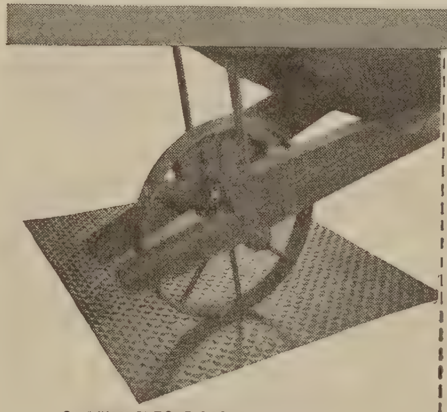
The Charles T. Main Award to Alvaro R. Boera, Stevens Institute

TRACTION

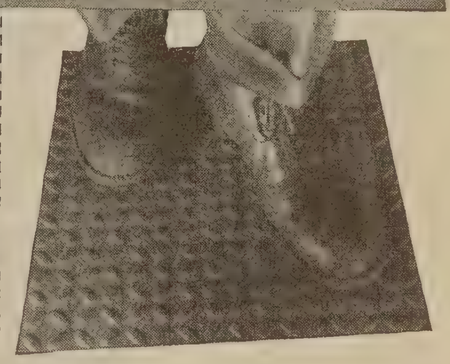
WET OR DRY

U·S·S Multigrip offers surer footing for workers...easier rolling for vehicles. It promotes foot comfort, lessens fatigue. Multigrip makes floors stronger and longer lasting. It provides easy cleaning and unobstructed drainage. There are no pockets in which dirt and water can accumulate. Installations are permanent, reducing plant maintenance cost.

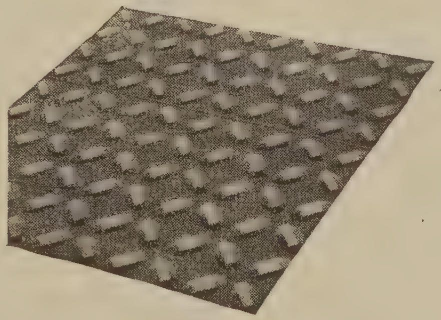
Get further information about Multigrip from your nearest steel warehouse or write to us direct.



● VEHICLES ROLL EASILY



● SAFE, SURE FOOTING



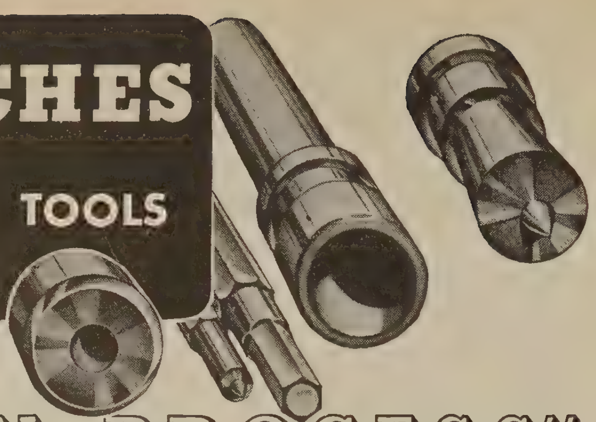
● PERFECT MATCH AT EDGES

CARNEGIE-ILLINOIS STEEL CORPORATION
USS
MULTIGRIP FLOOR PLATE
UNITED STATES STEEL

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
7-1211

UNITED STATES STEEL

PUNCHES
and
OTHER TOOLS



"NEW PROCESS"
PUNCHES—DIES
RIVET SETS
COMPRESSION RIVETER DIES
CHISEL BLANKS

Made from high-grade alloy tool steels properly heat-treated, of uniform high quality—may be purchased with complete confidence for maximum service.

SINCE 1903

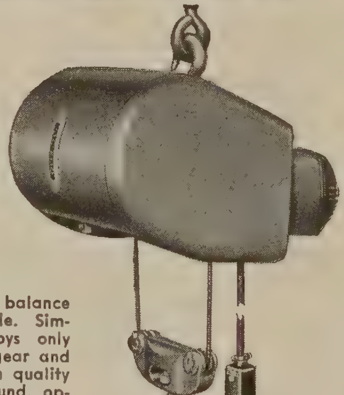
WRITE FOR OUR NEW CATALOG 46

GEO. F. MARCHANT COMPANY
1420-34 So. ROCKWELL ST., CHICAGO 8, ILL.

Conco Crane 2288

CONCO
TORPEDO
ELECTRIC HOISTS

- ★ 250-, 500- and 1000-lb. Capacities.
- ★ Hook, Bolt or Trolley Suspension.
- ★ Positive Electric Brake. Enclosed Limit Switch.
- ★ Push Button Controlled, for Safe, One-Hand Operation.



TODAY'S TOP VALUE IN HOISTS

MATERIALS HANDLING EXPOSITION
VISIT OUR EXHIBIT
BOOTH NO. 503
CLEVELAND - JAN. 12-16

Sturdy cast iron double drums balance load, eliminate overlapping cable. Simple, rugged construction employs only two gear reductions—one worm gear and one spur gear. Worm is of high quality steel forging, hardened and ground, operates on Timken radial thrust bearings. Best grade chilled phosphor bronze used for worm gear. Spur gears machined from forged steel blanks with full depth teeth. All gear shafts operate on ball bearings, fully enclosed, in a bath of oil.

The CONCO TORPEDO ELECTRIC HOIST is fast, compact, powerful, easy-to-operate. Double drum construction centers and balances load, assuring an even lift, freedom from sway, greater safety and efficiency for the operator. Write today for detailed specifications and prices. Prompt delivery.

CONCO ENGINEERING WORKS
15 GROVE STREET MENDOTA, ILLINOIS

of Technology graduate last spring, now with the Glenn L. Martin Aircraft Co., Baltimore, for his paper, "The Engineering Method—Its Value and Limitations."

The Gantt Medal, a joint presentation of the ASME with the Institute of Management was conferred on Alvin E. Dodd, of New York, president of the American Management Assn.

Kaiser Co., Inc., Answers Bradt's Cross Complaint

Los Angeles

• • • In filing documents in superior court here recently answering a cross complaint previously filed by Harlan H. Bradt in an effort to set aside an agreement covering the sale of rights to the rich Eagle Mountain iron ore deposits, Kaiser Co., Inc. asserted it had already spent millions of dollars in improving the property and immediate possession was necessary to keep the company's steel plant at Fontana operating.

Mr. Bradt has contended that he has a 25 pct interest in the leasehold and that the price at which the leasehold was sold to Kaiser Co., Inc. by E. T. Foley, principal owner, was much too low. His suit was originally filed against the Foley interests for the purpose of setting aside the sale or securing a judgment for a larger portion of the sale price. The Foley interests had requested the court to confirm the sale of the lease to Kaiser at a figure of $1,132,811 whereas Mr. Bradt contends the figure should be $9 million.

Engineers Elect Officers

Birmingham

• • • **James C. Gray**, general superintendent of coal mines, Tennessee Coal, Iron & Railroad Co., Birmingham, has been elected chairman of the Southeast Section of the American Institute of Mining and Metallurgical Engineers.

Dr. Gray succeeds Dr. Walter B. Jones, Tuscaloosa, state geologist, as chairman of the regional organization.

W. C. Chase, Birmingham, general superintendent of mines, Alabama By-Products Corp., was elected first vice chairman, and W. C. McKenzie, Bessemer, chief engineer of ore mines and quarries for T.C.I., second vice chairman.

87 Pct Recovery Of Alumina Is Reported By Bureau of Mines

Washington

• • • **A better** than 87 pct recovery of alumina from diaspore clay deposits surveyed in central Pennsylvania has been reported by the Bureau of Mines. The field is estimated to contain some 5 million tons of alumina, Director James Boyd said in making the report.

Using a Bureau sintering process which utilizes soda ash, limestone, coal and fuel oil, a ton of alumina is produced for each 360 lbs soda ash, 1.88 tons of high-calcium limestone, 1.6 tons coal, and 47 gals fuel oil required.

Although the alumina content of the clay ranges from 30 to 75 pct, the average runs about 45 pct, with varying percentages of silica and iron oxide minerals. The clay has been used extensively in manufacturing refractory brick.

The Bureau recommends construction of a 500-ton-a-day plant on the west branch of the Susquehanna river just below the town of Clearfield, a site near coal as well as the clay.

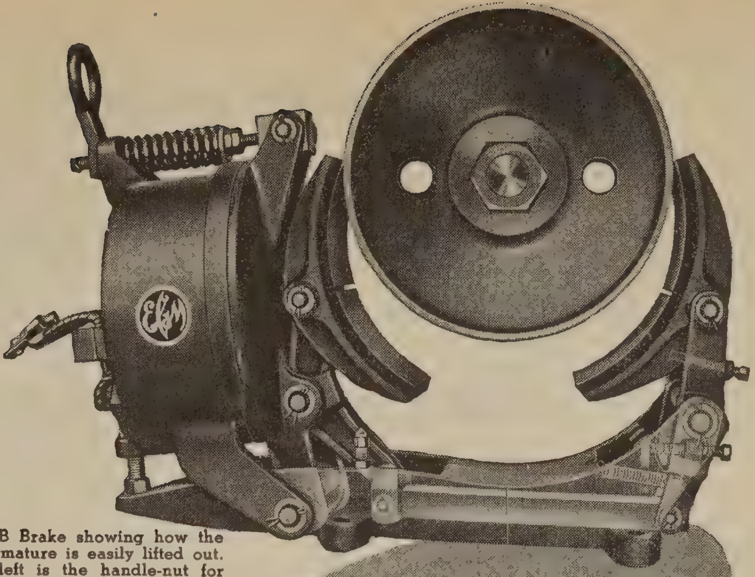
It further estimates that the initial capitalization required would amount to about $11,750,000 which would include plant investment, working capital and inventories. With a staff of about 725 employees, it is further estimated that such a plant could produce a ton of alumina for $42.15.

Allis-Chalmers to Expand Operations at West Allis

Milwaukee

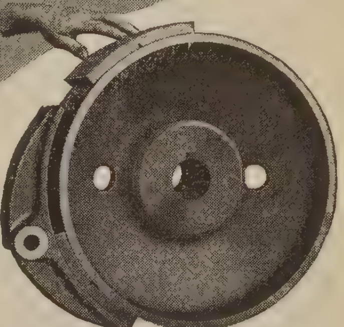
• • • **A drive to hire** 1540 men and build night shifts of the West Allis Works of the Allis-Chalmers Mfg. Co., Milwaukee, to a record peace-time high has been initiated. The order backlog in the company's general machinery division alone now runs more than $166 million.

The drive for additional employees is part of the company expansion program for which more than $38 million has been appropriated in recent years. Total appropriations for buildings, machine tools and other equipment at the West Allis Works add up to $14,800,000, with floor space having been increased approximately 30 pct since 1939.



Type WB Brake showing how the motor armature is easily lifted out. At top left is the handle-nut for compressing the spring when removing motor armature, changing brake shoes and for manual control.

Long Life Brakes for A-C and D-C Motors by EC&M

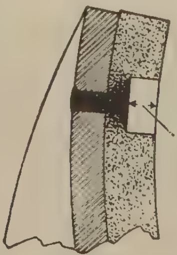


The brake lining is molded to match curvature of wheel and shoe.

These Type WB Brakes for a.c. and d.c. service have a block type lining which is both thick and tough.

Furthermore, due to the process of manufacture, the blocks have proper frictional quality *throughout the entire thickness* permitting uniform and complete wear down to rivet heads. And since the material is non-compressionable, brake adjustments are infrequent.

EC&M Type WB Brakes are built in several sizes. They can be supplied with series or shunt-wound operating coils for direct current motors. On alternating current service, they are supplied in shunt-wound form for use with a compact rectifier-unit. Send for Bulletins 1004 and 1006 describing these long life brakes.



Actual wearing thickness, between rivet heads and brake wheel, is 1/8″ on the smallest size to 1/2″ on the largest size.

EC&M

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

AVAILABLE FOR IMMEDIATE DELIVERY

NEVER USED

500-Ton Metal Working HYDRAULIC PRESS

Self-contained, single action with cushion. Semi-automatic push-button operated.

Right to left between columns . . . . 48″
Front to back between columns . . . . 48″
Right to left overall . . . . 72″
Stroke . . . 42″ Daylight . . . 48″

C. M. KENDRICK
250 Park Avenue • New York 17, New York

The Wire of a Thousand Uses

JOHNSON XLO MUSIC SPRING WIRE gives you maximum tensile strength, absolute uniformity of all physical properties now available with special corrosion resistant coating. Johnson special alloy coating has definite lubricating qualities, reducing tool wear, perfect base for soldering or plating. Withstands 700° Fahrenheit. Sizes .003″ to .080″.

Your nearest Johnson branch will give you prompt service.

JOHNSON
STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.
NEW YORK AKRON DETROIT CHICAGO LOS ANGELES TORONTO

Steel Priorities System To Benefit Makers Of British Export Items

London

• • • **A selective system** of steel priorities to assure supplies as far as is possible for programs which contribute to exports or, as in the case of agriculture, to the saving of imports, is to be introduced in Britain. Early this year a special priority was given to the requirements of programs which contributed to the expansion of fuel and power resources.

This involved the grant of special priority symbols for the whole of the approved steel requirements for those programs. The programs in question absorbed a large proportion of all steel available. To add the whole of the export and import-saving programs to the existing priority programs would create a position in which the priority element in steel would exceed the non-priority element, with the result that the priority label would tend to become meaningless.

The machinery for the allocation of steel now is under review with the object of ensuring that deliveries of steel more closely match the allocations. It should thus become possible gradually to reduce bulk priority authorizations.

It has been decided to introduce concurrently a strictly limited system of selective priorities, by means of which departments responsible for the existing priority programs or for export or import-saving programs will be able to authorize the use of the priority symbol to a very limited extent and in specific cases where essential production might be held up for lack of particular quantities or qualities of steel. As soon as this plan is in operation priority in supply of steel will apply only to orders duly authorized on a form which bears the initials P.M.L. (Prime Minister's List).

Auto Scribe Paid Tribute

Detroit

• • • **Honoring Dave Wilkie,** dean of automotive editors, more than 75 of his Detroit colleagues assembled recently on the occasion of Mr. Wilkie's 45th year of continuous service with the Associated Press.

$15 Million Program Will Build New Campus For Technical Institute

Chicago

• • • With the announcement of the $15 million development program of Illinois Institute of Technology the Chicago area promises to become the technological center of the world. The University of Chicago already has a vast expansion program underway including a "hot" laboratory devoted to nuclear physics. Many of the universities and other research foundations have or are planning to build similar facilities in this area.

Henry T. Heald, president of Illinois Institute of Technology, disclosed the extent of the plans to develop the "world's most modern college campus in one of the nation's worst blighted areas." It is expected that the Institute's expansion program now actually underway will be completed in 5 years. This program will eventually transform the technology center campus into a functionally modern educational and residential area for 10,000 persons.

Three new buildings already erected at the center are now in use and include the metals research building, a new wing to the engineering research building, and the Alumni Memorial Hall. Nearing completion is a new chemistry building, and the metallurgical and chemical engineering building. Under construction also are two four-story student dormitories, as part of the institute's plan to house 2000 students, staff and families in permanent apartments, residence and dormitory dwellings adjacent to the campus. Besides these buildings, 55 additional academic, laboratory, campus and housing structures will be erected, President Heald said.

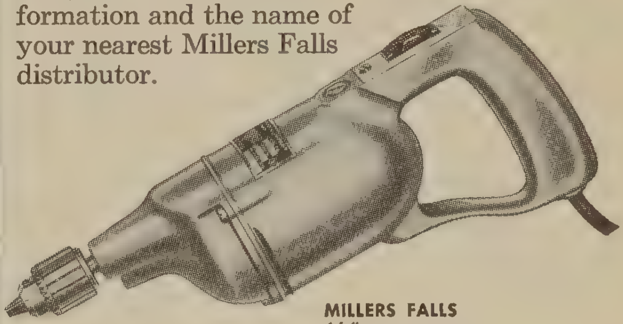
The president also pointed out that the rebuilding program eventually will replace the 50-year-old academic and laboratory buildings which the college has been using since it was founded in 1892 by the late Philip D. Armour. Illinois Tech is the result of a merger in 1940 of Armour Institute and Lewis Institute, founded in 1896 by the late Allen C. Lewis.

THEY'RE BACK . . .

ready to work at lowest cost

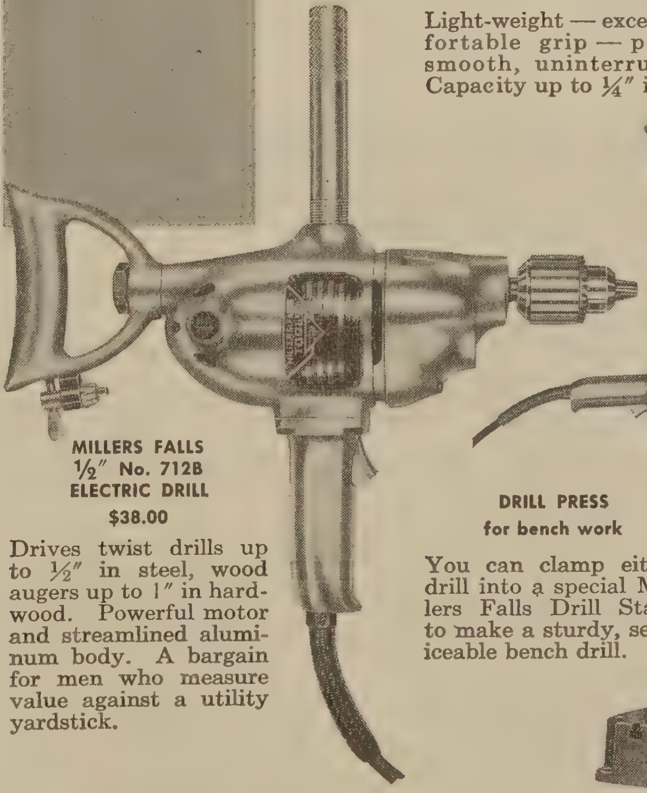
Whenever you need a versatile drill to speed up production, construction or maintenance — a drill that's designed for intermittent drilling in tool room, maintenance department or on the production line — choose one of these Millers Falls Electric Drills. You can be sure their attractive price tags do *not* indicate the high standard to which they are designed and engineered. Write for full information and the name of your nearest Millers Falls distributor.

You have plenty of jobs for these two utility drills



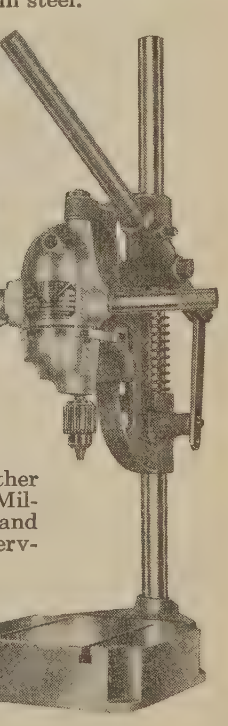
MILLERS FALLS
1/4" No. 314A
ELECTRIC DRILL
$22.75

Light-weight — excellent balance — comfortable grip — powerful motor for smooth, uninterrupted performance. Capacity up to 1/4" in steel.



MILLERS FALLS
1/2" No. 712B
ELECTRIC DRILL
$38.00

Drives twist drills up to 1/2" in steel, wood augers up to 1" in hardwood. Powerful motor and streamlined aluminum body. A bargain for men who measure value against a utility yardstick.



DRILL PRESS
for bench work

You can clamp either drill into a special Millers Falls Drill Stand to make a sturdy, serviceable bench drill.

MILLERS FALLS TOOLS SINCE 1868

MILLERS FALLS COMPANY
GREENFIELD, MASSACHUSETTS

HOT - HOT - HOT

Mark HOT METALS with
MARKAL PAINTSTIKS

Save Time
Save Money
Save Trouble

Plates being marked at 1800°F

Ideal for
STEEL, BRASS ZINC and ALUMINUM MILLS—also FOUNDRIES

MARKAL "A" For annealing, welding, hot plates and "stickers at the open hearth. Temperature range—60°F to 1200°F.

MARKAL "H" For hot coils, plates, slabs, billets, castings and forgings. Temperature range—150°F to 1400°F. Parts can be immersed immediately in cold water bath without defacing markings.

MARKAL "HT" For extremely hot surface marking. Temperature range—250°F to 1800°F. Dries instantly.

MARKAL "M" for marking metal surfaces from 0°F to 160°F which are subsequently to be annealed at various temperatures up to 1800°F. Marks withstand immediate quenching in water or oil.

Marks will not "run", "char", "flow", "discolor", "peel" or "crack." Marks are FADE-PROOF, WEATHERPROOF, PERMANENT.

Also types for cold surfaces

Tell us your marking problems We will solve without obligation.

Write for FREE SAMPLE

MARKAL CO. 629 N. Western Ave., Chicago 12, Ill.

Huge Rebuilding Facilities

Set BOTWINIK Apart As Your Most Dependable Source Of Machine Tools

Botwinik boasts of one of the finest and largest plants in the country, devoted to precision rebuilding of every type of machine tool. Leading metal working industries depend on this specialized and money-saving service, realizing that a Botwinik rebuilt machine tool can be depended upon for economical and profitable production. Ask Botwinik by wire, phone or letter how to put your production on a more profitable basis. Our trained engineers are ready to serve you.

Botwinik Brothers of Mass., Inc.
5 SHERMAN ST. • WORCESTER 1, MASS.

Passamaquoddy Tidal Power Project Draws Wide Range of Bids

Washington

• • • **Eleven bids** have been submitted to WAA by potential purchasers of the controversial Passamaquoddy Tidal Power project; offers ranged from $26,000 for the nine staff houses to $205,000 for the project as a whole.

The latter sum was offered by the Cantabrigian Youth Foundation which would establish a training school, contingent upon ability to finance the purchase within six months; a slightly lower offer of $203,466 was submitted by the Eastern Flexicore Co. of Boston which said the firm would use the facilities for manufacture of concrete block, pipes and related items.

Five bids, ranging from $116,000 to $187,000 were received from investment buyers who planned to resell or scrap the facilities. Appraisers have set the fair value of the facilities at slightly less than $400,000.

Zinc Producer Begins To Market Low-Carbon Ferromanganese Alloy

New York

• • • **New Jersey Zinc** Co. has begun to produce and sell low-carbon ferromanganese, used for alloying openhearth and electric furnace steels. Their new product is identified as "Low-Carbon Ferromanganese—901."

The high manganese content of the product, coupled with low carbon and silicon contents, is reported to have proved it an effective alloying agent in field tests carried on during the last few months. In openhearth tests the addition was made in the ladle. It is reported that there were no rejections for below grade physical properties, although previous practice was reported to have required rejections averaging 5 to 10 pct for metallurgical reasons. Steel plant defects are reported to be at least as low as those developed in heats of the same grade made with higher carbon ferromanganese.

Low-Carbon Ferromanganese—

901 is said to be in use by some nonferrous foundries for the production of manganese bronze castings.

The following analysis is said to be typical of the bulk of the company's production:

	Percent
Manganese	91.00
Carbon	0.06
Phosphorus	0.20
Sulfur	0.02
Silicon	0.25

New Jersey Zinc Co.'s low-carbon ferromanganese is normally crushed to 2 in. X down, but other commercial sizes can be shipped on request. Shipments are in bulk, or packed in steel drums containing 300 or 700 lb of material.

Davison Chemical Buys Silica Gel Warplant

Baltimore

• • • **A war-surplus** building constructed by the government to augment production of the Davison Chemical Corp. silica gel plant, Curtis Bay, Baltimore, has been sold to the Davison Corp. for $40,000 cash, War Assets Administration has announced. The purchase price is 71 pct of the appraised fair value of $56,000.

The property has been under lease to the Davison Corp. and has been used as storage space since the firm's output of silica gel dropped from 1,002,000 lb annually in 1945 to 113,000 lb for the year ending July 1947.

Interior Dept. Gets Cars

Washington

• • • **Disposal of** 701 troop cars to the Interior Dept. for transfer to the Alaskan Railroad and sale of 50 to the Chesapeake & Ohio Railroad has wiped out the original WAA inventory of surplus standard gage railway cars. This final lot was disposed of by negotiated sales after previous sealed bid and fixed price methods had been used.

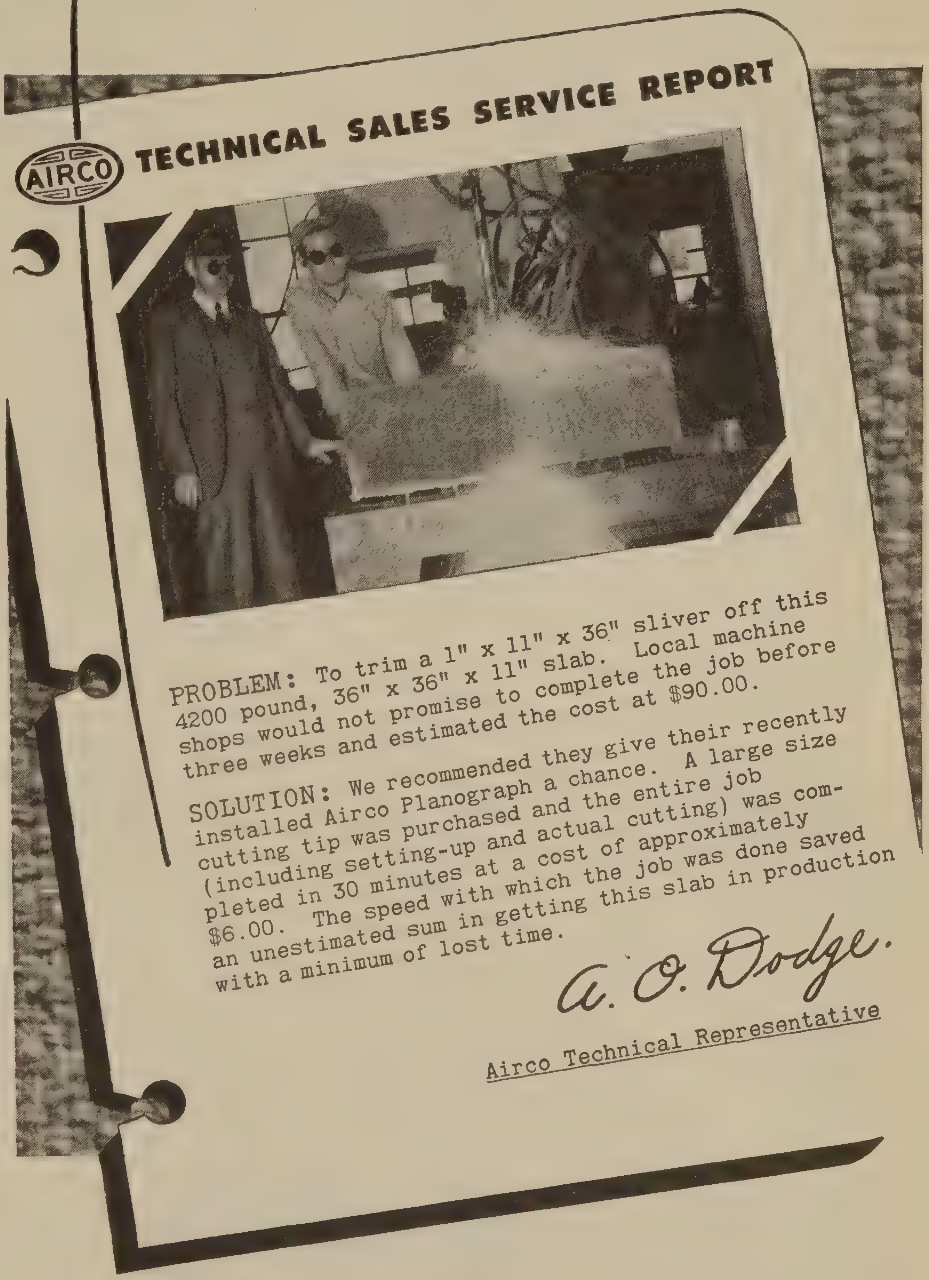
Auto Parts Sales Increase

Detroit

• • • **On the basis** of excise tax reports for the first seven months of 1947, the Automobile Manufacturers Assn. has estimated that factory sales of replacement parts and accessories will total about $2225 million this year compared with $1700 million in 1946.

THE STANDARD STEEL WORKS
OF NORTH KANSAS CITY, MISSOURI

● . . . saves 3 weeks with a 30 minute cut



AIRCO TECHNICAL SALES SERVICE REPORT

PROBLEM: To trim a 1" x 11" x 36" sliver off this 4200 pound, 36" x 36" x 11" slab. Local machine shops would not promise to complete the job before three weeks and estimated the cost at $90.00.

SOLUTION: We recommended they give their recently installed Airco Planograph a chance. A large size cutting tip was purchased and the entire job (including setting-up and actual cutting) was completed in 30 minutes at a cost of approximately $6.00. The speed with which the job was done saved an unestimated sum in getting this slab in production with a minimum of lost time.

A. O. Dodge.
Airco Technical Representative

Airco's Technical Sales Division is at the call of all industry in applying Airco processes and products in the solution of their problems. If you have a metal working problem, ask to have a Technical Sales Division man call. Address: Dept. IA-7328, Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., Houston 1, Texas.

Photo by W. L. Herrington, Kansas City

AIRCO AIR REDUCTION
Offices in All Principal Cities

TECHNICAL SALES SERVICE – ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

Common Plating Bath Troubles

(CONTINUED FROM PAGE 103)

ically and physically while acceptable plating was produced. If such a log includes data on gravity and conductivity, these measurements may be made as a rapid check on the total salt content and on the total ion content that carried the current. Rapid control corrections are often possible when conductivity and gravity data are available. For instance, where a hot bath is used and frequent additions of water are made, a sudden drop in gravity indicates a leak in the tank. In a cyanide bath a high gravity reading indicates too large a chemical addition or accumulation of carbonate.

While the chemical analysis is being made, a plating range test should be made on a small portion of the bath. If the plating range is normal, it is likely that the chemical analysis will not indicate trouble and attention may be turned to the tank, the electrical system, the cleaning cycle and the base metal.

If the plating range test is not normal, filtration and purification tests are in order. The appearance of the bath and the appearance of the plate indicate if filtration is liable to be helpful. In any case if the cause of the trouble is not suggested by the appearance of the plating test, then it is worth while to filter a portion of the bath and test for plating range again. Another portion of the bath may be treated by agitation with fine activated carbon followed by filtration and testing. A third portion of the bath may be electrolyzed at low current density and tested periodically by a plating range test.

A testing program of this sort will build up experience with running down trouble and the results of the test should be recorded in a plating log. A sketch of the plating range tests will be found particularly valuable for a permanent record because such tests are of little value without previous records or laboratory standards.

If filtration and purification steps show improvement, the amount of activated carbon, the treating time and the amount of electrolysis can be calculated for full scale treatment. Often such treatment will lead to the design of permanent full scale treating equipment. It may also be found that shut-down time can be kept to a minimum by continuous treatment or by the use of a storage tank where one solution is treated while a second is in use. Treating equipment often includes a filter and an electrolsis cell where the filter is of a type that may be loaded with activated carbon. The pump that forces the solution through the filter also serves to keep the bath agitated so that the solution is continuously brought in contact with the cathode. The efficiency of the purification cycle may be followed by plating range tests until enough data are accumulated to determine the amount of treatment required for the number of ampere hours the bath was in use. Fig. 3 shows a diagram of a treating system for continuous purification of a plating bath. The continuous system takes less floor space than a system for treating the entire solution.

There are many specific methods for removing common impurities in typical plating baths. For instance iron is removed from a nickel bath by chemical oxidation followed by raising the pH of the bath to precipitate the iron. Such common treating methods can be found in the texts on plating baths and often have to be used. It is difficult to remove large amounts of iron from a nickel bath by electrolysis without excessive plating of nickel. It is more economical and more rapid to remove the iron chemically, and other purification steps can be carried out simultaneously with the chemical treatment.

Invite Bids on War Plant

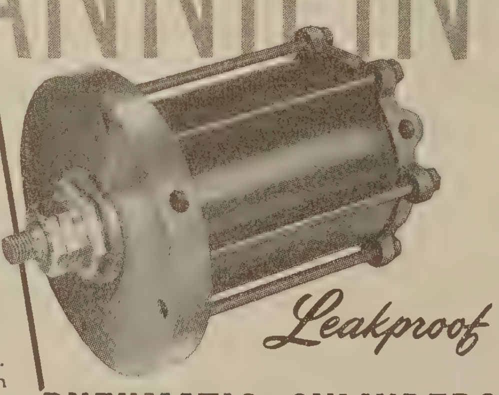
Washington

• • • **WAA has invited bids** for the alloy steel castings foundry at East St. Louis, Ill., operated during the war by the Key Co. A minimum acceptance price of $600,000 has been established by the disposal agency.

OPERATING ENGINEERS
like Hannifin Pneumatic Cylinders because they seldom require maintenance—thanks to Hannifin's exclusive "Leakproof" design which permits external adjustment of packing without disturbing internal parts. They also like the free-running performance that comes with Hannifin TRU-BORED and honed cylinders—their assurance of full power performance. For better plant operation, get genuine Hannifin cylinders.

BOTH AGREE ON... HANNIFIN

PRODUCT DESIGNERS
have placed their approval on Hannifin Pneumatic Cylinders because Hannifin gives them what they want: A completely standardized line of cylinders, available in many combinations. Any length stroke, double or single acting. Choice of mounting styles; single or double end rods. Diameters from 1" to 12", or larger. Cushions for head end, rod end or both. Complete engineering data in Hannifin Bulletin No. 57-S.



Leakproof
PNEUMATIC CYLINDERS

HANNIFIN CORPORATION
1101 So. Kilbourn Ave., Chicago 24, Ill.
AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

Weekly Gallup Polls

(CONTINUED FROM PAGE 145)

tion of Hollywood showed a pronounced sentiment in favor of punishment for those now held in contempt of Congress for failing to answer questions concerning alleged Communist connections.

However, opinion is closely divided on the question of whether the investigation of Hollywood was properly handled by the House committee.

To probe public attitudes the institute used a series of questions designed to cover various aspects of the situation. The survey was completed before the House took action on the contempt citations.

The first question sought to find how many people are familiar with the Hollywood investigation. It was found that approximately eight out of every ten had heard or read about it.

These people were then asked:

"What is your opinion of this investigation—do you approve or disapprove of the way it was handled?"

	Pct
Approve	37
Disapprove	36
No opinion	27

"Do you think the Hollywood writers who refused to say whether they were members of the Communist Party should be punished or not?"

	Pct
Should be	47
Should not	39
No opinion	14

Further analysis of the poll returns shows noticeable differences in attitudes on these questions among educational and occupational groupings.

Here is the way, for example, the various classifications vote on whether the witnesses should be punished who refused to say whether or not they are Communists:

	Should Be Punished Pct	Should Not be Punished Pct	No Opin. Pct
By Education:			
College	34	54	12
High School	44	43	13
Grammar	53	31	16
By Occupation:			
Prof. & Bus.	41	47	12
White Collar	36	51	13
Farmers	62	23	15
Others	49	35	16

The vote on approval or disapproval of the way the Hollywood investigation was handled shows similar patterns for these groups.

THERE'S PLENTY OF ROOM IN THE BALCONY!

"Main floor" storage is expensive — especially when overhead storage space is wasted. In many operations, outmoded handling methods prevent full utilization of the existing storage area. In many other operations, Towmotor Fork Lift Trucks have doubled, even tripled, storage capacity through high stacking of materials and products.

Let Towmotor show you how to "pack the house," convert waste space into profitable warehouse space. First step? Send for a Pocket Catalog describing the complete line of Towmotor Fork Lift Trucks and Accessories.

Send for Special Bulletins Describing the Towmotor
UNLOADER • UPENDER • SCOOP • CRANE ARM • RAM
EXTENSION FORKS • EXTENSION BACKREST
OVERHEAD GUARD

TOWMOTOR CORPORATION
DIVISION 15, 1226 EAST 152ND STREET, CLEVELAND 10, OHIO

TOWMOTOR
THE ONE-MAN-GANG
FORK LIFT TRUCKS *and* TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Impending Price Increases Seen Forcing in Some Business

Advances Not Yet Widespread But the Possibility Has Worried Some Users

• • • **Impending price increases** in many machine tool lines are forcing in some business this month which might have been held over until 1948, according to reliable sources in the trade.

Price increases are by no means widespread as yet, and few major segments of the industry have taken action, but the mere possibility has served to bring some of the hesitant into the fold.

Under these circumstances, it is possible that December might turn out to be as good a month as November.

Possibly another spur to December ordering is appropriation money which some machine tool users want to clean up before the first of the year, for tax or other reasons. In any event, for some segments of the industry December 1946 was 25 pct better than November 1946.

Some observers believe that 1948 will be a big year for the industry, despite the fact that the machine tool business has been receding since June, and a figure of $400 million has been advanced for 1948. This would probably require a 20 pct increase in prices, which, in turn, would probably be sufficient to drive all available business under cover for 6 months.

For many of the dealers, 1947 has been a good year, despite the JANMAT freeze on government-owned surplus machine tools in the second half. In most lines, they are no longer faced with the problem of extended deliveries, and in fact, many of the show machines are readily available.

Factory representatives in various sectors have a lot of quotations out, but orders are very spotty, and major segments of the industry are about to launch one of the most aggressive sales campaigns for machine tools seen in many a day, according to reports.

In Detroit, little has happened recently to upset the disturbingly quiet situation with respect to standard machines that has existed for many months. Also, cutting tool manufacturers are in the doldrums and see no relief from their present devastating competition with surplus and plant inventories. At the same time, the amount of orders for special transfer-type equipment is reported as growing to a point where competition is said to be as much a matter of prompt delivery as price. Machine tool builders with good reputations for delivering materials on time are very busy, it is reported. The prospects are that there will easily be enough business for all producers of this type of equipment within the next 6 months.

Another trend noted in Detroit is the tendency toward decentralization by the big car manufacturers. In a number of cases, it is reported, negotiations with machine tool suppliers are being carried out jointly with the car producer and his vendor. Although the machine is installed in the plant of the vendor, orders are being placed, it is said, in a number of such cases by the large car manufacturers.

In Cincinnati, reports as to activity in the market vary from one extreme to the other. Some companies report that a brisk ordering is going on, while another company indicated that it is anxious to obtain contract work in order to keep its shops running. While one source stated that during the past 60 to 90 days new orders have been very brisk, another large tool builder here reported that foreign orders had dropped slightly in number and that domestic orders were not coming in as briskly as had been expected.

Another source in Cincinnati indicated that the political situation has a great deal to do with the lack of optimism in the market and though there may be some increase in activity between now and May, probably in the spring there will be a slack period lasting until after the November elections. It was indicated that the unrest politically, the question of maintaining taxes, and the foreign policy of the present administration all were deterring factors in the surge of orders that was expected after the Machine Tool Show in September.

■

Mt. Gilead, Ohio

• • • **Hydraulic Press Mfg. Co.,** here, reported a net loss of $73,620 for the quarter ended Sept. 30 and a net loss of $5844 for the 9 months ended Sept. 30. The loss for the 9-month period is after provision of $12,000 for federal income taxes.

All but $16,000 of the $103,620 third quarter loss before taxes was occasioned by the decision of directors to write off remaining expenditures for intangible assets and research and development work incurred largely at the subsidiary, Hydro-Power, Inc. These expenditures were made over the past 1½ years in anticipation of a sales potential which has developed more slowly than expected.

Machinery Ordered For Lustron House Totals $1 Million

Columbus, Ohio

• • • **Orders totaling** nearly $1 million have been placed to date for machinery to be used in the production of the low-cost porcelain enamel steel Lustron House, Carl G. Strandlund, president of the Lustron Corp., announced recently.

An order for $800,000 worth of presses, ranging in size from 50 tons to two of 600 tons, has been placed with the Warren City Mfg. Co. of Warren, Ohio. Dies valued at $175,000 have been purchased from the Carlin Tool & Die Co., Detroit.

You'll Get Practical Milling Methods Like These with.. SUNDSTRAND "Engineered Production"

Basically, there are two approaches to solving milling production problems, (1) obtaining standard machines, then trying to process parts over these machines as economically as possible, (2) designing the most profitable processing method, then obtaining machines to suit this method — standard or semi-standard machines, if possible, or entirely special machines, if necessary.

This latter method is Sundstrand "Engineered Production" . . . the most practical approach to economical milling. The following is a brief resume of the complete engineering and manufacturing service available from Sundstrand to meet all or any of your production milling requirements in small and medium size work.

These actual examples are presented to reveal one of each of the methods used in solving milling production problems. One of these methods may be the solution to your present problem.

1

MILLING 204 PISTONS PER HOUR WITH STANDARD RIGIDMIL This Sundstrand No. 00 standard Hydraulic Rigidmil is tooled to mill the expansion control slot in automotive pistons. It has a single horizontal spindle with speeds from 85 to 3600 rpm. The table is 7½″ x 25″ and has 8″ of travel with a range of feeds from ½ to 37 inches per minute. The table is provided with work holding fixtures and a standard two-way automatic cycle. Consequently the operator loads in one fixture while work is being performed in the other. Loading time is free making it possible to mill 204 pistons every hour.

2

STANDARD RIGIDMIL WITH SPECIAL HEAD MILLING INTERNAL SLOTS SIMULTANEOUSLY Opposite slots inside of these gear shafts are milled on this standard Sundstrand Rigidmil provided with a special head. Quills have power movement endwise to bring cutters in and out of cutting position. The spindle head is provided with vertical power movement in combination with table movement to provide a rectangular cycle operating in a vertical plane. A special 2 spindle head replaces standard head so that 2 parts can be milled sumultaneously.

3

SPECIAL THREE HEAD RIGIDMIL MILLS, ROUGH AND FINISH BORES SIMULTANEOUSLY This four station special Rigidmil machines magnet frames in the following sequence: rough boring at station 1, face milling at station 2, finish boring at station 3, and loading and unloading at station 4.

This machine replaces a conventional multiple tool lathe and, in addition, includes a milling operation.

The machine cycle consists of rapid approach, feed, dwell and rapid return automatically. The cycle is timed and interlocked with the 90° indexing fixture which presents the work in exact relation to the tools. No relocation or repositioning of the part is required. Various models of magnet frames are accommodated on this one special Sundstrand Rigidmil.

FREE ADDITIONAL DATA: Write for more proof of the successful application of Sundstrand "Engineered" milling production. This new 40 page book contains over 35 actual problem solutions together with interesting tooling diagrams. Write for your copy today. Ask for bulletin No. 566.

SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

SUNDSTRAND
MACHINE TOOL COMPANY
2539 Eleventh St. • Rockford, Ill., U.S.A.

RIGIDMILS • AUTOMATIC LATHES • SPECIAL MILLING AND TURNING MACHINES

NONFERROUS METALS

. . . News and Market Activities

Copper

• • • **Consumers are** continuing to seek copper and the market is strong at 21.50¢. Foreign inquiries are being received in greater volume than in recent weeks. Major producers are still quoting 21.50¢ f.a.s. New York. Prices on the West Coast are reported at ¼¢ higher. Reports from brass mills indicate that their requirements for copper are gradually improving although it is acknowledged that their current volume of business does not approach the year's 1st quarter volume.

•

Aluminum

• • • **Producers** estimate that the present sheet and strip backlogs represent 14 to 15 weeks of production. Aluminum cable-steel reinforced is likewise available on long term delivery, due principally to the shortage of steel wire. Other aluminum products do not have quite as extended a delivery period. This situation represents a drastic change from the summer months when producers were out seeking business to the extent that price cuts in some sheet products were made.

•

Brass Group Elects Goss

New York

• • • **William M. Goss,** vice president of Scovill Manufacturing Co., Waterbury, Conn., was elected president of the Copper and Brass Research Assn. last week at the annual meeting. Other officers elected were: Vice presidents, H. W. Steinkraus, president of Bridgeport Brass Co.; S. H. Perry, general sales manager of Chase Brass and Copper Co., Inc.; G. D. Stearns, president of Bridgeport Rolling Mills Co., and A. C. Wheeler, vice president of Seymour Manufacturing Co. F. L. Riggin, president of Mueller Brass Co., treasurer; T. E. Veltfort, manager; and Bertram B. Caddle, secretary.

•

Raise Magnesium Price

New York

• • • **The Dow Chemical Co.,** now the only producer of primary magnesium in the country, has changed its method of pricing magnesium ingots effective Dec. 1. After that time ingots are sold f.o.b. Freeport, Tex., at 20.50¢ per lb. Formerly the price basis was f.o.b. Midland, Mich., minimum freight allowed. The market for magnesium is reported to have declined ever since the end of the war. The situation is so acute that one fabricator has gone out of the market for sheet and strip and is no longer accepting orders for those products. This fabricator is still accepting orders for rod, tubing and extrusions, but reports that the volume of business in those products is way down. It is understood that Dow is building up stocks of ingot at its Freeport plant.

•

Anodes, Salts Available

New York

• • • **Anode and plating** salts suppliers report that for the first time since the war their products are available in a 1-week delivery period. This early delivery time applies to copper and cadmium anodes and salts, as well as to nickel and other metals and salts. Platers had completed, early this year, their replacement of the nickel anodes and salts requisitioned by the government during the war, in some cases suppliers report that their reordering covered a full year's requirements. During the summer months orders for plating supplies were practically non-existent; there has been some measure of improvement in the fall and winter months.

•

Announce Extra Increases

Waterbury, Conn.

• • • **The American Brass Co.** has announced quantity extra increases effective Nov. 28 on orders for less than 1000 lb of brass mill products listed under schedules A, C and D. Schedule B extras have not been changed. Under schedule D, which covers seamless tubing, as revised, two sets of extra charges will replace the former three sets. One set of extras under the new schedule D applies to tubing under 5 in. in OD; the other, to tubing 5 in. OD and over.

Under freight allowance revision, freight will be prepaid on single shipments of 200 lb or more to any one destination in the U. S., seller reserving the right to control the routing. The previous freight allowance was up to $1.00 per 100 lb on shipments of 100 lb or more.

•

Zinc

• • • Improvement in the zinc market is highlighted by the figures released by the American Zinc Institute for November. Domestic shipments during that month reached 65,702 tons, over 7000 tons above October shipments which represented an equal increase over September. The improved market situation is also reflected in the lower tonnage made available for government account, only 3962 tons in November compared with 63,386 tons in October and over 31,000 tons each in August and September. Total tonnage for government account has now reached 130,759 tons. Unfilled orders at the end of November rose 8000 tons to 43,250. Production of zinc during November was down 2000 tons to 69,682. Industry stocks at the end of the month dropped 10,000 tons to 69,166 tons.

Nonferrous Metals Prices

Cents per pound

	Dec. 3	Dec. 4	Dec. 5	Dec. 6	Dec. 8	Dec. 9
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	80.00	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

NONFERROUS METALS PRICES

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point, freight allowed	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be.	$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be	$35.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$80 to $90
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$80 to $82
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$66 to $69
Silver, New York, cents per oz.	74.625
Tin, Straits, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.06
Zirconium copper, 6 pct Zr. per lb contained Zr.	$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	17.50-18.00
No. 120	17.00-17.50
No. 123	16.50-17.00
80-10-10 ingot	
No. 305	21.50-22.00
No. 315	19.50-20.00
88-10-2 ingot	
No. 210	27.75-28.25
No. 215	25.75-26.25
No. 245	21.25-21.75
Yellow ingot	
No. 405	13.75-14.50
Manganese Bronze	
No. 421	17.50-18.00

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 capper, max.	16.00-16.75
0.60 copper, max.	15.50-16.25
Piston alloys (No. 122 type).	15.50-16.00
No. 12 alum. (No. 2 grade).	15.25-15.75
108 alloy	15.50-16.00
195 alloy	15.50-16.50
AXS-679	15.75-16.25
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-95½ pct	15.25-16.00
Grade 2—92 pct-95 pct	14.00-15.00
Grade 3—90 pct-92 pct	13.50-14.50
Grade 4—85 pct-90 pct	13.25-14.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	**37⅝**
Electrodeposited	**32.34**
Rolled, oval, straight, delivered	**32.59**
Brass, 80-20, frt allowed	
Cast, oval. 15 in. or longer	**33⅝**
Zinc, cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	**52**
Silver 999 fine	
Rolled, 1000 oz. lots, per troy oz.	**67¼**

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	44.50
Copper sulfate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	**14.50**
Silver cyanide, 100 oz. lots, per oz.	**54.00**
Sodium cyanide, 96 pct, domestic, 200 lb drums	16.00
Zinc cyanide, 100 lb drums	35.50
Zinc sulfate, 89 pct, granules, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall; 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75-S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness; 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam. rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢ 10,000 lb base. B & S gage 00-1; 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod: M, diam, in., ¼ to ⅜, 47¢; ½ to ¾, 45¢ 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	81

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.50
Large, over 12 in.	14.50

Copper, Brass, Bronze

Cents per pound, freight prepaid on 200 lb.

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.04*	31.07	31.38
Yellow brass	32.39*	29.32	29.63
Red brass	34.65*	31.68	31.99
Naval brass	29.56	28.31	34.25
Leaded brass	27.98	24.39	30.13
Commercial bronze	35.52*	32.80	33.11
Manganese bronze	33.14	31.64	37.75
Phosphor bronze, 5 pct.	53.25*	52.25	52.00
Muntz metal	29.17	27.92	32.36
Everdur, Herculoy, Olympic, etc.	37.07	35.57	38.44
Nickel silver, 5 pct.	41.20	40.28	38.67
Architectural bronze	27.94	....	....

*Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings	**14½**
Loose yellow brass trimmings	**15½**

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire	16 —16½
No. 2 heavy copper and wire	15 —15½
Light copper	13½—14
Auto radiators (unsweated).	8¾— 9¼
No. 1 composition	11½—12
No. 1 composition turnings	11 —11½
Clean red car boxes	9½—10
Cocks and faucets	9¼— 9¾
Mixed heavy yellow brass	7 — 7½
Old rolled brass	7½— 8
Brass pipe	8¾— 9¼
New soft brass clippings	11½—12
Brass rod ends	9 — 9½
No. 1 brass rod turnings	8½— 9

Aluminum

Alum. pistons with struts	4½— 5
Aluminum crankcases	6 — 6½
2S aluminum clippings	9 — 9½
Old sheet & Utensils	6 — 6½
Mixed borings and turnings	— 2
Misc. cast aluminum	5½— 6
Dural clips (24S)	5 — 5½

Zinc

New zinc clippings	6 — 6½
Old zinc	4½— 5
Zinc routings	2½— 3
Old die cast scrap	2½— 3

Nickel and Monel

Pure nickel clippings	15½—17½
Clean nickel turnings	14 —15
Nickel anodes	16 —17
Nickel rod ends	16 —17
New Monel clippings	12 —13
Clean Monel turnings	7 — 8
Old sheet Monel	10 —10½
Old Monel castings	7½— 8
Inconel clippings	8 — 8½
Nickel silver clippings, mixed	7½— 8
Nickel silver turnings, mixed	5½— 6

Lead

Soft scrap lead	10¾—11¼
Battery plates (dry)	6 — 6½

Magnesium Alloys

Segregated solids	6½— 7
Castings	4½— 5½

Miscellaneous

Block tin	63 —65
No. 1 pewter	48 —50
No. 1 auto babbitt	38 —40
Mixed common babbitt	11½—12
Solder joints	14½—15
Siphon tops	38 —40
Small foundry type	13 —13½
Monotype	12 —12½
Lino and stereotype	11½—12
Electrotype	10 —10½
New type shell cuttings	11 —11½
Clean hand picked type shells	4½— 5
Lino and stereo dross	5 — 5½
Electro dross	3¼— 3½

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect Freight equalized with nearest free delivery point.

Full lead sheets	**18.25**
Cut lead sheets	**18.75**
Lead pipe, manufacturing point	**17.50**
Lead traps and bends.......List	**+42%**
Combination lead and iron bends and ferrules, also combination lead and iron ferrules ....List	**+42%**
Lead wool	**19.50**

For High Density Bales . . . use the Self-Contained

LOGEMANN Scrap Presses

Press, Pump, Tank . . . all in one compact assembly

Available with Automatic Control

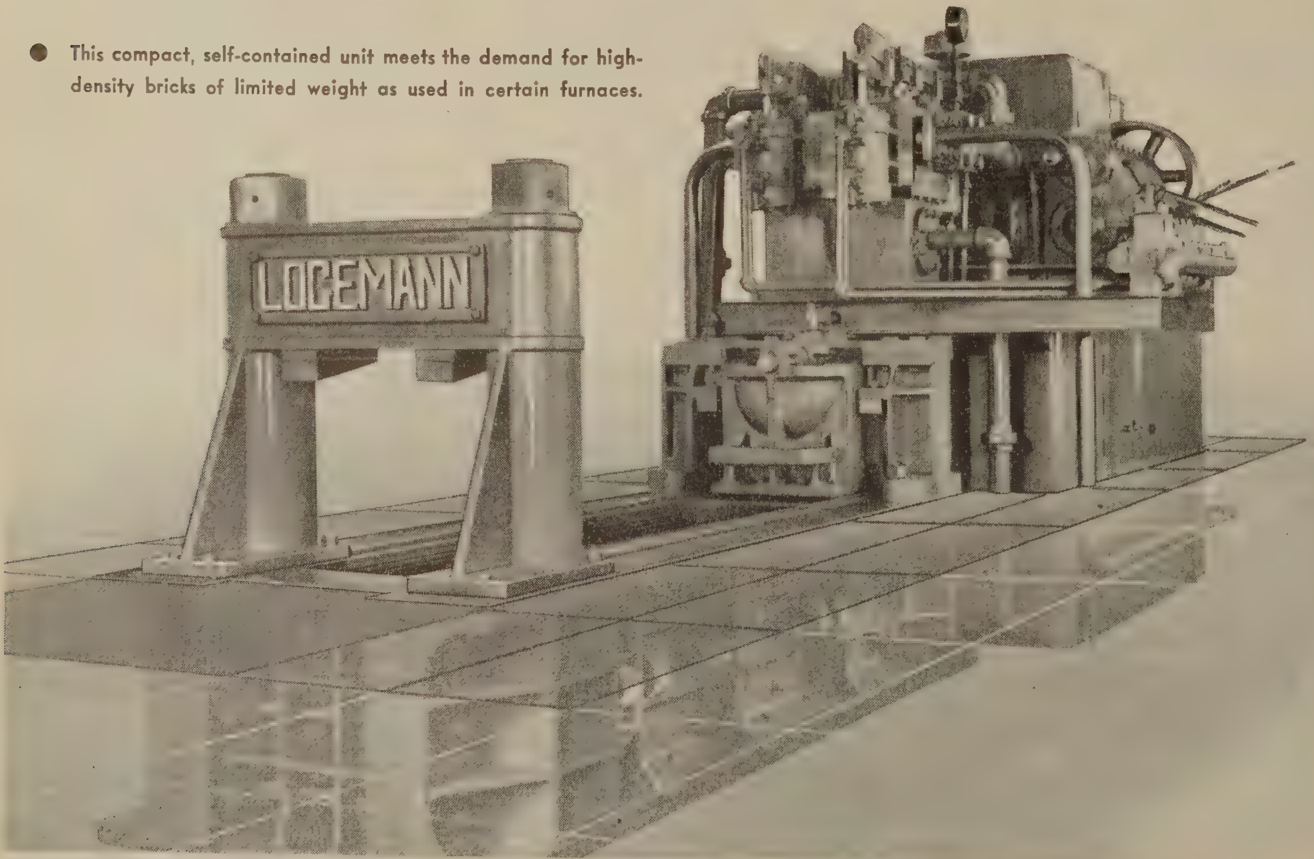
Both two and three ram models are available with automatic controls . . . and are recommended when the nature of the scrap warrants such application and where high output is desired.

You conserve floor space and piping in plants and yards where space is limited . . . and at the same time, handle high tonnages at extremely low operating cost.

Pioneers in the metal baling field, LOGEMANN engineers have embodied the features proved through actual operation to be essential to constant, uninterrupted service. These same engineers are prepared to offer suggestions as to operating layout and installation of any unusual or specific need. Present your problem to them, stating the nature of your scrap and the tonnage desired. There is no obligation.

LOGEMANN BROTHERS CO.

3164 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN



- This compact, self-contained unit meets the demand for high-density bricks of limited weight as used in certain furnaces.

Little Material Moving at Formula Prices

New York

• • • There were no significant changes in heavy melting steel prices in the major consuming areas, but there was a dearth of material at the formula prices which most mills are offering at the present time. Government efforts to encourage the flow of scrap from occupied Germany are being received with some skepticism, although scrap industry officials will be participating in missions leaving for Europe at the beginning of the year to study the problem.

The general tightness of steel scrap grades has steel purchasers somewhat jittery. Purchasing agents recall bitterly the October experience when they had been largely out of the market, as they are now, for free market steelmaking grades. When one mill went in to buy with a higher price, the scrap market saw one of its sharpest upward turns over a 3-day period. None of the purchasers want to get caught on the tail end of such a deal—none want to be the first to step out with a new higher price, but almost all would like to be the second guy to do so. On the other hand, it will be possible to buy scrap at the formula price, if no buyer steps out of line.

Inventories are reported to be strong by some consumers, but it is known that at least one or two large users are in a critical situation. One company in the Buffalo district is continuing to pick up off the ground to ship to another of its mills in another district.

There is a pronounced tendency in several district markets to set up some type of hybrid low phos-industrial scrap-No. 1 special grade, moving at a premium above the published price for No. 1 steelmaking scrap. In some areas the tonnages involved at times exceed the total transactions of anything that can properly be called No. 1.

•

PITTSBURGH — No substantial new openhearth business has been done at $40. Probably none will until next year. In the meantime some mill buyers are showing signs of nervousness. Business can be done at $40 if no one will pay more: The fear is that someone will get in a jam and raise the ante. "I wouldn't," said one purchasing agent, "want to be the one first to upset the applecart. But if someone else does, I want to get my orders out second."

•

CHICAGO — The time clock appears to be set at Jan. 1. Dealers are stocking the yards and not shipping anything unless they have to. The mills report they are running close to the line but will make every effort to keep the present price until Jan. Immediately after the first of the year observers predict quick action. Either the mills get the withheld scrap at their price or the formula prices fall apart. Dealers seem convinced they are safe either way as they do not expect the market to go down. Railroad specialties hit a new high here last week with malleable going at $70 to $71 a gross ton.

•

PHILADELPHIA — Mills are still out of the market for steel scrap grades and brokers are no longer buying. Shipments on old orders are reported to be fair. In the absence of current commitments, there are no changes from last week's quotations. Buying of cast scrap is reported to be active at quoted high prices. Navy and railroad scrap awarded during the past week are reported to have sold at prices well above current quotations.

•

CLEVELAND — While some major consumers cancelled outstanding orders with their brokers Nov. 22, other consumers have not seen fit to do so and have extended effective dates under one pretense or another. This practice will probably continue until the consumers who cancelled become weary of seeing all the scrap run into their competitors' plants, and the battle for scrap at any price will be on. Some sources in the trade believe this might take place next week.

•

DETROIT—With high priced orders out of the way, the Detroit scrap market appears to have settled down to a period of watchful waiting. Attempts to hold the prices of heavy melting scrap at $37 to the consumer have thus far been successful; and low phos grades are now pegged at a level $5 above this. There are no indications, however, that scrap is moving freely at these prices since most dealers, except for the shipment of occasional cars, appear to be waiting out December to see what happens next.

•

CINCINNATI—While the market here remains fairly active dealers report that some mills are offering on the basis of a formula price based on the old OPA price for Cincinnati of $18.70 plus $20. One mill in this district reports that they are buying scrap in rather good quantities and that this formula price is about right. Most of the scrap for that particular mill however is earmarked industrial scrap and there is no reaching out to other districts for scrap.

•

ST. LOUIS — Because of the heavy demand, plus scarcity, plus bidding from outside markets, foundry grades continued to advance in the St. Louis market. Melting grades are unchanged and mills have been able to buy at prices they set for December, although the quantity is limited, dealers shipping only material which must be moved. Railroad lists: Gulf Mobile & Ohio, 20 cars; Missouri-Kansas-Texas, 10 cars and Chicago Burlington & Quincy approximately 2000 tons.

•

BUFFALO — The calm of the openhearth scrap market was unbroken by new buying this week, but beneath the surface was a maze of confusing cross currents. One of the leading consumers was reported picking up some of its reserves for shipment to a less fortunate sister mill outside the district, and a steel mill blast furnace was listed for a speedy relining job in January. A few old orders in the high price range were still outstanding.

•

NEW YORK — There was some remaining activity here at $37 for No. 1 scrap, while there was also buying at the formula price of $33.50. Brokers here are gradually running out of high priced orders, although there is evidence of a strong undertone in the market. Cast grades continue their upward swing in the face of a declining steelmaking scrap market.

•

BOSTON — At long last the brokers have definitely settled on $31 to $31.50 a ton f.o.b. for heavy steel, $28 to $28.50 for shoveling turnings and $25.50 to $26 for machine shop turnings and mixed borings and turnings. These prices are $3.50 to $4 a ton below this week's quotations. At midweek no scrap had been bought at the new offers. In the past week $37.25 f.o.b. for Pittsburgh delivery and $35 for eastern Pennsylvania delivery was offered and paid for heavy steel, presumably on "old" orders.

•

BIRMINGHAM — Only dribbles of openhearth grades are moving to consumers in this area as dealers continue to stand on the contention that the current mill offer of $37 is too low. It's a different story for cast, however, with the seller making the market. Substantial tonnages of No. 1 cupola cast have gone at $55, an advance of $4.

•

TORONTO—Scrap iron and steel receipts dropped into a slump during the past week when a heavy blanket of snow suspended shipments from outside points and also interrupted deliveries in the local district. It is apparent that scrap collections in the rural districts will be closed until next spring, and dealers will depend entirely on industrial scrap to maintain deliveries to consuming plants.

IRON AND STEEL SCRAP PRICES

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	....	$40.00
RR. hvy. melting	$40.50 to	41.00
No. 2 hvy. melting	....	40.00
RR. scrap rails	49.00 to	50.00
Rails 2 ft. and under	54.00 to	55.00
No. 1 comp'd bundles	....	40.00
Hand bdld. new shts.	....	40.00
Hvy. axle turn.	41.50 to	42.00
Hvy. steel forge turn.	41.50 to	42.00
Mach. shop turn.	35.00 to	35.50
Shoveling turn.	36.50 to	37.00
Mixed bor. and turn.	35.00 to	35.50
Cast iron borings	35.50 to	36.00
No. 1 cupola cast.	53.00 to	54.00
Hvy. breakable cast.	40.50 to	41.50
Malleable	59.00 to	60.00
RR. knuck, and coup.	52.50 to	53.50
RR. coil springs	52.50 to	53.50
RR. leaf springs	52.50 to	53.50
Rolled steel wheels	52.50 to	53.50
Low phos.	47.00 to	48.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to	$39.00
No. 2 hvy. melting	38.50 to	39.00
No. 1 bundles	38.50 to	39.00
No. 2 dealers' bundles	38.50 to	39.00
Bundled mach. shop turn.	38.50 to	39.00
Galv. bundles	36.50 to	37.00
Mach. shop turn.	33.50 to	34.00
Short shov. turn.	35.50 to	36.00
Cast iron borings	34.50 to	35.00
Mix. borings & turn.	33.50 to	34.00
Low phos, hvy. forge	47.00 to	48.00
Low phos, plates	44.00 to	45.00
No. 1 RR. hvy. melt.	41.25 to	46.00
Rerolling rails	59.00 to	60.00
Miscellaneous rails	52.00 to	53.00
Angles & splice bars	52.00 to	53.00
Locomotive tires, cut	55.00 to	56.00
Cut bolster & side frames	54.00 to	54.50
Standard stl. car axles	56.00 to	57.00
No. 3 steel wheels	51.00 to	51.50
Couplers & Knuckles	51.50 to	52.00
Rails 2 ft. and under	56.00 to	57.00
Malleable	70.00 to	71.00
No. 1 mach. cast.	58.00 to	59.00
No. 1 agricul. cast.	54.00 to	55.00
Hvy. breakable cast.	45.00 to	48.00
RR. grate bars	50.00 to	51.00
Cast iron brake shoes	51.00 to	52.00
Cast iron carwheels	48.00 to	49.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to	$40.00
No. 2 hvy. melting	38.00 to	40.00
No. 1 bundles	38.00 to	40.00
No. 2 bundles	38.00 to	40.00
Mach. shop turn.	33.00 to	34.00
Shoveling turn.	33.00 to	34.00
Cast iron borings	30.00 to	31.00
Mixed bor. & turn.	30.00 to	31.00
Low phos. plate	49.00 to	50.00
No. 1 cupola cast.	53.00 to	55.00
Hvy. breakable cast.	42.00 to	43.00
Scrap rails	49.00 to	50.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy melting	$35.00 to	$36.00
No. 2 hvy. melting	35.00 to	36.00
Nos. 1 and 2 bundles	35.00 to	36.00
Busheling	35.00 to	36.00
Shoveling turn.	31.50 to	32.00
Machine shop turn.	29.00 to	30.00
Mixed bor. & turn.	29.00 to	30.00
Cl'n cast. chem. bor.	33.00 to	34.00
No. 1 machinery cast.	44.00 to	45.00
No. 2 machinery cast.	44.00 to	45.00
Heavy breakable cast.	40.00 to	41.00
Stove plate	39.00 to	40.00

DETROIT

Per gross ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$34.75 to	$35.25
No. 2 hvy. melting	34.75 to	35.25
No. 1 bundles	34.75 to	35.25
New busheling	34.75 to	35.25
Flashings	34.75 to	35.25
Mach. shop turn.	28.50 to	29.00
Shoveling turn.	29.50 to	30.00
Cast iron borings	29.50 to	30.00
Mixed bor. & turn.	29.50 to	30.00
Low phos. plate	39.75 to	40.25
No. 1 cupola cast.	46.00 to	47.00
Heavy breakable cast.	42.00 to	43.00
Stove plate	42.00 to	43.00
Automotive cast.	46.00 to	47.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.50 to	$42.50
No. 2 hvy. melting	41.50 to	42.50
No. 1 bundles	41.50 to	42.50
No. 2 bundles	41.50 to	42.50
Mach. shop turn.	33.50 to	34.50
Shoveling turn.	35.00 to	36.00
Mixed bor. & turn.	33.50 to	34.50
Clean cast chemical bor.	39.00 to	41.00
No. 1 machinery cast.	52.00 to	55.00
No. 1 mixed yard cast.	49.00 to	50.00
Hvy. breakable cast.	49.00 to	50.00
Clean auto cast.	52.00 to	54.00
Hvy. axle forge turn.	43.50 to	44.50
Low phos. plate	47.00 to	48.00
Low phos. punchings	47.00 to	48.00
Low phos. bundles	46.00 to	47.00
RR. steel wheels	50.00 to	51.00
RR. coil springs	50.00 to	51.00
RR. malleable	60.00 to	65.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.50 to	$41.00
No. 2 hvy. melting	38.00 to	39.00
Bundled sheets	38.00 to	39.00
Mach. shop turn.	32.00 to	33.00
Locomotive tires, uncut	46.00 to	47.00
Mis. std. sec. rails	52.00 to	53.00
Rerolling rails	57.00 to	58.00
Steel angle bars	50.00 to	51.00
Rails 3 ft. and under	54.00 to	55.00
RR. steel springs	47.00 to	48.00
Steel car axles	51.00 to	52.00
Grate bars	47.00 to	48.00
Brake shoes	47.00 to	48.00
Malleable	64.00 to	65.00
Cast iron car wheels	47.50 to	48.50
No. 1 machinery cast.	51.00 to	52.00
Hvy. breakable cast	43.00 to	44.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to	$38.00
No. 2 hvy. melting	37.00 to	38.00
No. 2 bundles	37.00 to	38.00
No. 1 busheling	37.00 to	38.00
Long turnings	23.00 to	24.00
Shoveling turnings	25.00 to	26.00
Cast iron borings	24.00 to	25.00
Bar crops and plate	38.00 to	38.50
Structural and plate	38.00 to	38.50
No. 1 cupola cast.	53.00 to	55.00
Stove plate	50.00 to	51.00
No. 1 RR. hvy. melt.	36.00 to	37.00
Steel axles	38.00 to	39.00
Scrap rails	37.50 to	38.00
Rerolling rails	48.00 to	49.00
Angles & splice bars	40.00 to	41.00
Rails 3 ft. & under	40.00 to	41.00
Cast iron carwheels	45.00 to	47.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.50 to	$40.00
No. 2 hvy. melting	39.50 to	40.00
Mach. shop turn.	34.50 to	35.00
Short shov. turn.	36.50 to	37.00
Cast iron borings	35.50 to	36.00
Low phos	47.00 to	47.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$33.50 to	$37.00
No. 2 hvy. melting	33.50 to	37.00
No. 2 bundles	33.50 to	37.00
Comp. galv. bundles	33.00 to	33.50
Mach. shop turn.	25.00 to	26.00
Mixed bor. & turn.	25.00 to	26.00
Shoveling turn.	28.00 to	29.00
No. 1 cupola cast.	46.00 to	47.00
Hvy. breakable cast.	46.00 to	47.00
Charging box cast.	46.00 to	47.00
Stove plate	46.00 to	47.00
Clean auto cast.	46.00 to	47.00
Unstrip. motor blks.	43.50 to	44.00
Cl'n chem. cast bor.	33.50 to	34.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to	$40.00
No. 2 hvy. melting	39.00 to	40.00
No. 1 bundles	39.00 to	40.00
No. 2 bundles	39.00 to	40.00
No. 1 busheling	39.00 to	40.00
Mach. shop turn.	32.50 to	33.50
Shoveling turn.	34.50 to	35.50
Cast iron borings	31.50 to	32.50
Mixed bor. & turn.	31.50 to	32.50
Mixed cupola cast.	48.00 to	50.00
Charging box cast.	46.00 to	48.00
Stove plate	47.00 to	49.00
Clean auto cast.	51.00 to	52.00
RR. Malleable	60.00 to	65.00
Small indl. malleable	45.00 to	47.00
Low phos. plate	44.00 to	47.00
Scrap rails	47.00 to	48.00
Rails 3 ft. & under	50.00 to	52.00
RR. steel wheels	46.00 to	48.00
Cast iron carwheels	46.00 to	48.00
RR. coil & leaf spgs.	46.00 to	48.00
RR. knuckles & coup.	46.00 to	48.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to	$39.50
No. 2 hvy. melting	39.00 to	39.50
No. 1 bundles	39.00 to	39.50
No. 1 busheling	39.00 to	39.50
Drop forge flashings	39.00 to	39.50
Mach. shop turn.	34.00 to	34.50
Shoveling turn.	36.00 to	36.50
Steel axle turn.	39.00 to	39.50
Cast iron borings	35.00 to	35.50
Mixed bor. & turn.	34.00 to	34.50
Low phos.	44.00 to	44.50
No. 1 machinery cast.	56.00 to	60.00
Malleable	65.00 to	68.00
RR. cast.	57.00 to	58.00
Railroad grate bars	48.00 to	50.00
Stove plate	52.00 to	54.00
RR. hvy. melting	40.00 to	40.50
Rails 3 ft. & under	57.00 to	58.00
Rails 18 in. & under	58.00 to	60.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	....	$25.00
No. 2 hvy. melting	....	25.00
No. 2 bales	....	25.00

Per gross ton delivered to consumer:

No. 3 bales	....	$19.50
Mach. shop turn.	....	16.00
Elec. furn. 1 ft. und	$32.00 to	34.00
No. 1 cupola cast.	32.00 to	33.00
RR. hvy. melting	....	26.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	....	$25.50
No. 2 hvy. melting	....	25.50
No. 1 bales	....	25.50
No. 2 bales	....	25.50
No. 3 bales	....	19.50
Mach. shop turn.	....	17.50
No. 1 cupola cast.	$36.00 to	40.00
RR. hvy. melting	....	26.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$24.00 to	$26.50
Elec. furn. 1 ft. and und.	27.50 to	30.00
No. 1 cupola cast.	....	27.50
RR. hvy. melting	25.00 to	26.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting		$22.00*
No. 1 bundles		22.00*
No. 2 bundles		21.50*
Mechanical bundles		20.00*
Mixed steel scrap		19.00*
Mixed borings and turnings		17.00*
Rails, remelting		23.00*
Rails, rerolling		26.00*
Bushelings		17.00*
Bushelings, new fact., prep'd		21.00*
Bushelings, new fact., unprep'd		16.00*
Short steel turnings		17.00*
No. 1 cast.	36.00 to	40.00

*Ceiling Price.

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-rolled Steel: (cents per pound)	Dec. 9, 1947	Dec. 2, 1947	Nov. 11, 1947	Dec. 10, 1946
Hot-rolled sheets	2.80	2.80	2.80	2.50
Cold-rolled sheets	3.55	3.55	3.55	3.20
Galvanized sheets (10 ga.)	3.95	3.95	3.95	3.55
Hot-rolled strip	2.80	2.80	2.80	2.50
Cold-rolled strip	3.55	3.55	3.55	3.20
Plates	2.95	2.95	2.95	2.50
Plates wrought iron	6.85	6.85	6.85	4.112
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.30
*24 gage				
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.90	2.90	2.90	2.50
Cold-finished bars	3.55	3.55	3.55	3.10
Alloy bars	3.30	3.30	3.30	2.92
Structural shapes	2.80	2.80	2.80	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	25.97
Wrought iron bars	7.15	7.15	7.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.55	3.55	3.55	3.05
Wire nails	4.25	4.25	4.25	3.75
Rails: (dollars per 100 lb)				
Heavy rails	$2.75	$2.75	$2.75	$43.39*
Light rails	3.10	3.10	3.10	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00	$45.00	$45.00	$39.00
Sheet bars	66.00	66.00	66.00	38.00
Slabs, rerolling	45.00	45.00	45.00	39.00
Forging Billets	55.00	55.00	55.00	47.00
Alloy blooms, billets slabs	66.00	66.00	66.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.80	2.80	2.80	2.30
Skelp	2.60	2.60	2.60	2.05

Pig Iron: (per gross ton)	Dec. 9, 1947	Dec. 2, 1947	Nov. 11, 1947	Dec. 10, 1946
No. 2, foundry, Phila.	$40.97	$40.97	$41.36	$32.43
No. 2, Valley furnace	36.50	36.50	36.50	30.50
No. 2, Southern Cin'ti	40.24	40.24	40.24	29.80
No. 2, Birmingham	34.88	34.88	34.88	26.88
No. 2, foundry, Chicago†	36.00	36.00	36.00	30.50
Basic del'd Philadelphia	40.47	40.47	40.86	31.93
Basic, Valley furnace	36.00	36.00	36.00	30.00
Malleable, Chicago†	36.50	36.50	36.50	30.50
Malleable, Valley	36.50	36.50	36.50	30.50
Charcoal, Chicago	56.04	56.04	56.04	42.34
Ferromanganese‡	145.00	145.00	145.00	135.00

---

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.

‡ For carlots at seaboard.

Scrap: (per gross ton)	Dec. 9, 1947	Dec. 2, 1947	Nov. 11, 1947	Dec. 10, 1946
Heavy melt'g steel, P'gh.	$40.00	$40.00	$42.50	$25.25
Heavy melt'g steel, Phila.	42.00	42.00	42.50	24.50
Heavy melt'g steel, Ch'go	38.75	38.75	39.50	25.25
No. 1, hy. comp. sheet, Det.	34.75	34.75	34.75	22.32
Low phos. Youngs'n	47.25	47.25	46.25	27.75
No. 1, cast, Pittsburgh	53.50	53.50	49.50	34.50
No. 1, cast, Philadelphia	53.50	53.50	53.00	40.50
No. 1, cast, Chicago	58.50	52.50	53.50	39.75
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.50	$8.75
Foundry coke, prompt	14.00	14.00	14.00	8.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	21.50	19.50
Copper, Lake, Conn.	21.625	21.625	21.625	19.625
Tin, Straits, New York	80.00	80.00	80.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	11.65
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	23.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Dec. 9, 1947	3.18925¢ per lb.	$36.96 per gross ton	$40.25 per gross ton
One week ago	3.18925¢ per lb.	$36.96 per gross ton	$40.25 per gross ton
One month ago	3.18925¢ per lb.	$37.06 per gross ton	$41.50 per gross ton
One year ago	2.72122¢ per lb.	$30.14 per gross ton	$25.00 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1947	3.18925¢ Aug. 12	2.87118¢ Jan. 7	$37.35 Aug. 10	$30.14 Jan. 7	$42.58 Oct. 28	$29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1941	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1940	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1939	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1938	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1937	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1936	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1935	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1934	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1933	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1932	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1931	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1930	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1929	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over, (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: includes 3 pct freight tax. (14) Delivered Kaiser Co. prices: includes 3 pct freight tax. (15) to 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Spot market as high as $92 gross ton or higher. (17) Delivered Los Angeles: add ½¢ per 100 lb for San Francisco. (18) Slab prices subject to negotiation in most cases. Some producers charge (19) $2 more, (21) $1 more. Some producers charge (22) 0.05¢ less, (23) 0.10¢ less, (24) 0.20¢ less.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO		
													Detroit	New York	Philadelphia
INGOTS Carbon, rerolling					($38.00 f. o. b. mill)		(Spot market as high as $86 to $90 gross ton)								
Carbon, forging	$46.00														
Alloy	$56.00									(Canton = $56.00)					
BILLETS, BLOOMS, SLABS Carbon, rerolling [18]	$45.00[19]	$45.00[19]	$45.00[19]	$47.00	$45.00[19]	$45.00[19]							$48.00[19]		
Carbon, forging billets	$55.00	$55.00	$55.00	$55.00	$55.00	$55.00							$58.00		
Alloy	$66.00	$66.00				$66.00		(Bethlehem, Massillon, Canton = $66.00)					$69.00		
SHEET BARS[16]							$66.00								
PIPE SKELP	2.60¢[21]	2.65¢					2.60¢[21]								
WIRE RODS	2.80¢[21]	2.80¢[21]		2.80¢[21]	2.85¢		(Worcester = 2.90¢[21])					3.52¢[13]			
SHEETS Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	3.175¢	(Ashland, Ky. = 2.80¢)		3.54[17]¢	2.95¢	3.12¢	3.02¢
Cold-rolled[1]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.70¢	4.00¢	3.97¢
Galvanized (10 gage)	3.95¢[23]	3.95¢[23]	3.95¢[23]		3.95¢[23]		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland = 3.95¢)	4.62¢[17]		4.27¢	4.17¢
Enameling (12 gage)	3.95¢[22]	3.95¢[22]	3.95¢[22]	3.95¢			3.95¢		4.05¢	3.95¢			4.10¢[22]	4.42¢	4.37¢
Long ternes [2] (10 gage)	4.05¢[24]	4.05¢[24]	3.85¢											4.52¢	4.47¢
STRIP Hot-rolled [3]	2.80¢	2.80¢	2.80¢	2.80¢[15]	2.80¢		2.80¢					3.60¢[17]	2.95¢	3.27¢	3.22¢
Cold-rolled [4]	3.55¢	3.65¢		3.55¢			3.55¢			(Worcester = 3.75¢)			3.70¢	4.02¢	3.97¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.57¢	
TINPLATE Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85	(Warren, Ohio = $5.75)				$6.175	$6.074
Electro, box {0.25 lb. 0.50 lb. 0.75 lb.	Deduct 90¢ from standard coke base box price. Deduct 70¢ from standard coke base box price. Deduct 50¢ from standard coke base box price.														
BLACKPLATE, 29 gage[5]	3.90¢	3.90¢	3.90¢		4.00¢			4.00¢	4.00¢					4.32¢	4.22¢
BLACKPLATE, CANMAKING 55 lb. to 70 lb. 75 lb. to 95 lb. 100 lb. to 118 lb.	Deduct $1.55 from standard coke base box. Deduct $1.65 from standard coke base box. Deduct $1.55 from standard coke base box.														
TERNES, MFG., Special coated	Deduct 85¢ from standard coke base box price.														
BARS Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢					3.625¢[17]	3.05¢	3.35¢	3.32¢
Rail steel[6]	Subject to negotiation because of fluctuating scrap prices.														
Reinforcing (billet)[7]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢				3.325¢[17]		3.07¢	2.97¢
Reinforcing (rail)	Subject to negotiation because of fluctuating scrap prices.														
Cold-finished[8]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢							3.70¢	4.00¢	3.97¢
Alloy, hot-rolled	3.30¢	3.30¢				3.30¢	3.30¢	(Bethlehem, Massillon, Canton = 3.30¢)					3.45¢		3.45¢
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢							4.25¢		
PLATE Carbon steel[12]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢	(Coatesville = 3.15¢, Claymont = 3.30¢, Geneva, Utah = 3.10¢) 2.95¢				3.76¢[14]		3.27¢	3.17¢
Floor plates	4.20¢	4.20¢												4.67¢	4.62¢
Alloy	3.80¢	3.80¢			(Coatesville = 4.50¢)									4.27¢	4.22¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢	(Geneva, Utah = 2.95¢, Bethlehem = 2.80¢)					3.43¢[10]		3.02¢	2.95¢
SPRING STEEL, C-R 0.08 to 0.40 carbon	3.55¢			3.55¢			(Worcester = 3.75¢)								
0.41 to 0.60 carbon	5.05¢			5.05¢			(Worcester = 5.25¢)								
0.61 to 0.80 carbon	5.65¢			5.65¢			(Worcester = 5.85¢)								
0.81 to 1.05 carbon	7.15¢			7.15¢			(Worcester = 7.35¢)								
1.06 to 1.35 carbon	9.45¢			9.45¢			(Worcester = 9.65¢)								
MANUFACTURERS' WIRE[9] Bright	3.55¢	3.55¢		3.55¢	3.55¢		(Worcester = 3.65¢, Duluth = 3.60¢)					4.56¢[13]		3.99¢	3.97¢
Galvanized					Add proper size extra and galvanizing extra to Bright Wire Base										
Spring (high carbon)	4.60¢	4.60¢		4.60¢	(Worcester = 4.70¢, Duluth = 4.85¢)					(Trenton = 4.85¢)		5.28¢[13]		5.04¢	4.96¢
PILING, Steel sheet	3.30¢	3.30¢				3.30¢								3.75¢	3.72¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

	Chromium Nickel		Straight Chromium			
Basing Point	**No. 304**	**No. 302**	**No. 410**	**No. 430**	**No. 442**	**No. 446**
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation		Subject to negotiation			
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	Subject to negotiation		Subject to negotiation			
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation		Subject to negotiation			
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt., Beth	Subject to negotiation		Subject to negotiation			
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville, Beth	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	*Cr*	*V*	*Mo*	*Co*	*Base Per lb*
18	4	1	—	—	82¢
18	4	1	—	5	$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢

High-carbon-chromium*	47¢
Oil hardening manganese*	26¢
Special carbon*	24¢
Extra carbon*	20¢
Regular carbon*	17¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.50¢
Armature	4.80¢
Electrical	5.30¢
Motor	6.05¢
Dynamo	6.75¢
Transformer 72	7.25¢
Transformer 65	7.95¢
Transformer 58	8.65¢
Transformer 52	9.45¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb No. 1 O.H., per 100 lb	$2.75
Angle splice bars, 100 lb	3.25
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$3.10
Light rails (from rail steel), f.o.b. Williamsport, Pa.	3.45

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.05¢
Tie plates, Pittsburg, Calif.	3.20¢
Track bolts	7.00¢
Track bolts, heat treated, to rail roads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio; Weirton, W. Va.; St. Louis, Kansas City, Minnequa, Colo.; Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa.; Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

Stainless-clad	*Plate*	*Sheet*
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

---

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	*Delivered San Francisco*
Standard & coated nails	$4.25†	$5.33
Galvanized nails‡‡	4.00†	5.08
Cut nails, carloads, Pittsburgh base	5.80*	....

---

† 10¢ additional at Cleveland, 35¢ at Worcester. ‡‡ Plus $2.75 per 100 lb galvanizing extra. *Less 20¢ to jobbers.

	Base per 100 lb	
Annealed fence wire	$4.20‡	$5.21
Annealed galv. fence wire	4.65‡	5.66

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column	
Woven wire fence*	91	114
Fence posts, carloads	90††	...
Single loop bale ties	91	115
Galvanized barbed wire**	101	121
Twisted barbless wire	101	...

---

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. ††Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	Hi Steel	Mayari R	Otiscoloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	....	5.30	5.30	5.30	5.30	5.30
Galvanized	....	5.85	....	....	....	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.30	4.30	....	4.30	4.30	4.30	4.30	4.30
Cold-rolled	....	....	5.30	....	....	5.30	5.30	5.30	5.30†
Shapes	....	4.30	....	....	4.30	4.30	4.30	4.30	....
Beams	....	4.30	....	....	....	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.45	4.45	....	....	4.45	4.45	4.45	4.45
Cold-rolled	....	....	....	....	....	....	....	....	....
Bar shapes	....	4.45	....	....	4.45	4.45	4.45	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv,
½-in.	50½	34½
¾-in.	53½	38½
1-in.	56	41½
1¼-in.	56½	42
1½-in.	57	42½
2 in.	57½	43
2½ and 3-in,	58	43½
Wrought Iron, buttweld		
½-in.	+ 7	+29
¾-in.	2½	+19
1 and 1¼-in.	8	+11
1½-in.	13½	+ 7½
2-in.	14	+ 7
Steel, lapweld		
2-in.	49	34
2½ and 3-in.	52	37
3½ to 6-in.	54	39
Steel, seamless		
2-in.	48	33
2½ and 3-in.	51	36
3½ to 6-in.	53	38
Wrought Iron, lapweld		
2-in.	5½	+14½
2½ to 3½-in.	8	+10½
4-in.	12	+ 5
4½ to 8-in.	10	+ 6½

Extra Strong, plain ends

Steel, buttweld		
½-in.	49½	35
¾-in.	53½	39
1-in.	55½	42
1¼-in.	56	42½
1½-in.	56½	43
2-in.	57	43½
2½ and 3-in.	57½	44
Wrought Iron, buttweld		
½-in.	+ 2½	+23
¾-in.	3½	+17
1 to 2-in.	13	+ 7
Steel, lapweld		
2-in.	48	34
2½ and 3-in.	52	38
3½ to 6-in.	55½	41½
Steel, seamless		
2-in.	47	33
2½ and 3-in.	51	37
3½ to 6-in.	54½	40½
Wrought Iron, lapweld		
2-in.	8½	+11
2½ to 4-in.	17½	+ ½
4½ to 6-in.	13	+ 5

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

		Seamless		Electric Weld	
OD in in.	Gage BWG	Hot-Rolled	Cold-Drawn	Hot-Rolled	Cold-Drawn
2	13	$16.67	$19.99	$16.17	$19.39
2½	12	22.42	26.87	21.75	26.06
3	12	24.93	29.90	24.18	29.00
3½	11	31.17	37.39	30.23	36.27
4	10	38.69	46.38	37.53	44.99

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in. del'd Chicago	$86.12
6-in. to 24-in. del'd New York	84.18
6-in. to 24-in., Birmingham	74.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	100.90

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Percent Off List
½ in. & smaller x 6 in. & shorter	45
9/16 & ⅝ in. x 6 in. & shorter	46
¾ in. & larger x 6 in. & shorter	43
All diam, longer than 6 in.	41
Lag, all diam over 6 in. long	44
Lag, all diam x 6 in. & shorter	46
Plow bolts	54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	43
9/16 to 1 in. inclusive	42
1⅛ to 1½ in. inclusive	40
1⅝ in. and larger	35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller		46
½ in. and smaller	44	...
½ in. through 1 in.		44
9/16 in. through 1 in.	43	..
1⅛ in. through 1½ in.	41	42
1⅝ in and larger	35	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate	65 and 10
In bulk	75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)	*Base per 100 lb*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.65
F.o.b. Lebanon, Pa.	5.80

Small Rivets

(7/16 in. and smaller)	*Percent Off List*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55

Cap and Set Screws

(In packages)	*Percent Off List*
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	53
¾ to 1 in. x 6 in., SAE 1035, heat treated	44
Set screws, oval points	56
Milled studs	29
Flat head cap screws, listed sizes	16
Fillister head cap, listed sizes	37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh	30¢ to 31½¢
Copper, reduced, 150 and 200 mesh	29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots	10¢ to 17¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	35¢ to 37¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	29¢ to 32¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 26¢
Antimony, 100 mesh	36.05¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.025
Lead, 100, 200, & 300 mesh	18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser	49¢
Nickel, 100 mesh	51½¢
Silicon, 100 mesh	26¢
Solder powder, 100 mesh	8½¢ plus metal
Stainless steel, 302, minus 100 mesh	75¢
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$3.05
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$12.00 to $13.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	13.50 to 14.50
Foundry, Byproduct	
Chicago, del'd	$18.60
Chicago, f.o.b.	17.50
New England, del'd	19.75
Seaboard, Kearney, N. J., f.o.b.	17.85
Philadelphia, del'd	17.83
Swedeland, Pa., f.o.b.	16.90
Buffalo, del'd	18.75
Ashland, Ohio, f.o.b.	15.50
Painesville, Ohio, f.o.b.	16.60
Erie, del'd	19.95
Cleveland, del'd	17.90
Cincinnati, del'd	18.59
St. Louis, del'd	18.03
Birmingham, del'd	15.76

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
No. 1, Ohio	$67.00
First quality, Pa., Md., Ky., Mo., Ohio	73.00
First quality, New Jersey	78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio	67.00
Sec. quality, New Jersey	70.00
No. 2, Ohio	59.00
Ground fire clay, net ton, bulk	10.50

Silica Brick

Pennsylvania and Birmingham	$73.00
Chicago District and Alabama	82.00
Silica cement, net ton (Eastern)	12.50
East Chicago	13.50

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$64.00

Magnesite Brick

Standard, Balt. and Chester	$86.00
Chemically bonded, Baltimore	75.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in bulk	$46.50
Domestic, f.o.b. Chewelah, Wash., in bulk	24.00
in sacks	28.00

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest; add 10¢; Missouri Valley; add 20¢.	$11.05

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.47	$5.73	$5 82	$4.78	$5.68	$4.82	$4.55	$4.83	$5.53	$8.34	$8.44	$9.88	$9.95
New York	4.71	5.72[1]	6.11	5.03	5.86	5.06	4.75	5.02	5.57	8.40	8.50	9 92	10.02
Boston	4.76	5.63[12]	6.16[12]	4.76	6.73	5.11	4.82	4.98	5.63	8.62	8.72	9.98	10.08
Baltimore	4.31	...	5.71	4.76	....	4.76	4.68	4.81	5.51	....	....	...	....
Norfolk	4.80			5.20	....	5.05	5.05	5.10	5.90	....	....	....	....
Chicago	4.25	5.10	5.65	4.35	5.45	4.60	4.40	4.40	5.10	8.05	8.15	9.30	9.40
Milwaukee	4.429	5.279[1]	5.829	4.529	5.629[5]	4.779	4.579	4.579	5.279	8.379	8.479	9.629	9.729
Cleveland	4.25	4.95	5.78	4.52	5.00	4.60†	4.65	4.40	5.10	8.33	8.43	9.30	9.49
Buffalo	4.25	5.10	6.00	4.70	5.65[5]	4.95	4.40‡	4.40‡	5.10	8.05	8.15	9.30	9.40
Detroit	4.35	5.20	6.02	4.72	5.63	4.88†	4.77	4.50	5.22	8.50	8.60	9.73	9.78
Cincinnati	4.51	5.19	5.74	4.74	5.70	4.95	4.79	4.75	5.45	..	..	.	....
St. Louis	4.58	5.43[1]	5.87	4.68	5.82	4.88	4.73	4.73	5.47	8.57	8.67	9.82	9.92
Pittsburgh	4.25	5.10[1]	5.65	4.35	....	4.60	4.40	4.40	5.10	8.05	8.15	9.30	9.40
St. Paul	4.63	5.48[1]	5.88[2]	4.73[7]	....	4.93[7]	4.78[7]	4.78[7]	5.91[6]	....	....	....	....
Omaha	4.868	6.118[1]	6.468	5.168	....	5.418	5.218	5.218	5.918	....	....	....	....
Indianapolis	4.553	5.324	5.874	4.653	5.753	4.903	4.703	4.703	5.403	....	....	....	....
Birmingham	4.45[11]	...	5.65	4.45[11]	....	4.65[11]	4.40[11]	4.40[11]	6.04	....	....	....	....
Memphis	4.82[11]	5.87[1]	6.37	5.02[11]	....	5.17[11]	4.97[11]	4.97[11]	5 87	....	....	....	....
New Orleans	*4.98[11]	6.29[1]	...	5.18[11]	....	5.33[11]	*5.03[11]	*5.13[11]	6.29[6]	..	..	..	..
Houston	5.30	....	6.60	5.25	....	5.35	5.15	5.30	6.80	9.40[17]	9.20[17]	10.35[17]	10.45[17]
Los Angeles	5.75	7.35[1]	7.40	6.05	8.70[5]	5.55	5.35	5.50	7.35[14]	9.55[15]	9.35[15]	10.95[15]	11.05[15]
San Francisco	5.40[8]	6.65	6.85	5.75[8]	....	5.50	5.20	5.05	7.50[10]	9.55[15]	9.35[15]	10.95[15]	11.05[15]
Seattle	5.45[4]	7.25[2]	6.85	5.60[4]	....	5.60[4]	5.25[4]	5.45[4]	7.45[14]	....	8.55[16]	....	11.15[16]
Portland	5.30[4]	7.10[2]	6.70	5.60[4]	....	5.45[4]	5.25[4]	5.55[4]	7.45[14]	....	....	....	....
Salt Lake City	6.40	....	7.85	6.70	....	6.20	6.35	6.55	7.55	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 450 to 1499 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) 1000 to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

‡ Add 35¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	37.00	37.50	38.00	38.50	.....
Birmingham	32.88- 35.88	33.38- 36.38	.....	....	.....
Buffalo	36.00- 39.50*	36.00- 40.00*	36.50- 40.50*	.....	.....
Chicago	35.50	36.00	36.50	37.00	.....
Cleveland	35.50- 39 25 *	36.00- 39.75 *	36.50- 40.25 *	.. .	.....
Duluth	36.00	36.50	37.00	37.50	.....
Erie	35.50	36.00	36.50	37.00	.....
Everett	...	45.00	45.50	.....	.....
Granite City	36.50	37.00	37.00	.....	.....
Neville Island	36.00	36.50	36.50	37.00	.....
Provo	36 00	36.50	.. ..	. ..	.....
Sharpsville	36.00	36.50	36.50	37.00	.. ..
Steelton	37.00	.....	.....	.....	42.00
Struthers, Ohio	36.50	.....	... .	.....	.....
Swedeland	41.00	41.50	42.00	42.50	.....
Toledo	35.50	36.00	36.50	37.00	....
Troy, N. Y.	37.00	37.50	38.00	38.50	42.00
Youngstown	36.00	36.50	36.50	37.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	45.50	46.00	.....	...
Boston	Steelton	5.30	.....	...	...	....	47.30
Brooklyn	Bethlehem	3.30	40.30	40.80	41.30	41.80	.....
Cincinnati	Birmingham	5.36	38.24- 41.25	38.74- 41.74	.....	...	.....
Jersey City	Bethlehem	2.02	39 02	39.52	40.02	40.52	.....
Los Angeles	Provo	6.53	42.53	43.03	..	. ..	.....
Mansfield	Cleveland-Toledo	2.56	38.06- 41.81*	38.56- 42.31*	39.06- 42.81*	39.56	.....
Philadelphia	Bethlehem	1.84	38.84	39.34	39.84	40.34	....
Philadelphia	Swedeland	1.11	42.11	42.61	43.11	43.61	....
Philadelphia	Steelton	2.38	39.38	.. .	.....	.....	44.38
San Francisco	Provo	6.53	42.53	43.03	.....	.....	.....
Seattle	Provo	6.53	42.53	43.03	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	37.25	37.75	37.75	.....	.....

---

* Republic Steel Corp. price. Basis: Average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$45.50; f.o.b. Buffalo—$46.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorous $50.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, $56.04. High phosphorous charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	**$145**
Less ton lots (packed)	189
Delivered Pittsburgh	151

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets

Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.70	8.95	9.50
Ton lots	10.30	10.90	12.80
Less ton lots	11.20	11.80	13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	**19-21% Mn 3% max. Si**
Carloads	**$46.00**	**$47.00**
F.o.b Pittsburgh	**50.00**	**51.00**

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	**32**
L.c.l. lots	**34**

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	**32**
Ton lots	**34**
Less ton lots	**36**

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	**Ton**	**Less**
0.07% max. C. 0.06% P. 90% mn.	23.00	24.85	26.05
0.10% max. C	22.50	24.35	25.55
0.15% max. C	22.00	23.85	25.05
0.30% max. C	21.50	23.35	24.55
0.50% max. C	21.00	22.85	24.05
0.75% max. C. 7.00% max. Si	18.00	19.85	21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	7.80
Ton lots	9.45

Briquets

Contract basis, carlots, bulk freight allowed, per lb of briquet	8.75
Ton lots	10.35
Less ton lots	11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $73.00 f.o.b. Keokuk, Iowa; $73.75 f.o.b. Niagara Falls; $70.75, f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add 50¢ per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	16.90	17.50	18.10
97% Si, 1% Fe	17.30	17.90	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	5.25	5.50	5.70
Ton lots	6.85	7.45	7.75
Less ton lots	7.75	8.35	8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50	....	....
50% Si	9.30	9.80	10.00
75% Si	11.80	12.10	12.85
85% Si.	13.30	13.60	14.35
90% Si	15.00	15.30	16.00

Ferrochrome (65-72%Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	26.50	26.90	27.00
0.10% C	26.00	26.40	26.50
0.15% C	25.50	25.90	26.00
0.20% C	25.25	25.65	25.75
0.50% C	25.00	25.40	25.50
1.00% C	24.50	24.90	24.75
2.00% C	24.25	24.65	24.75
65-69% Cr, 4-9% C	18.60	19.00	19.15
62-66% Cr. 4-6% C. 6-9% Si.	18.60	19.00	19.15

Briquets

Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	12.50	12.75	12.85
Ton lots	14.00	14.90	15.50
Less ton lots	14.90	15.80	16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S M Ferrochrome

Contract price, cents per pound chrominum contained, lump sie, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	19.70	20.10	20.25
Ton lots	21.85	23.15	23.95
Less ton lots	23.35	24.65	25.45

Low carbon type: 62-66% Cr, 4-6% Si. 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	25.00	25.40	25.50
Ton lots	27.30	27.95	29.15
Less ton lots	29.10	29.75	30.95

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, packed, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	97.00	98.50	99.75
0.50% max. C	93.00	94.50	95.75
9.00% min. C	91.50	93.00	94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	16.25	16.75	18.80
Ton lots	19.35	20.10	22.25
Less ton lots	20.85	21.60	23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	17.50	18.00	20.05
Ton lots	19.80	20.65	22.40
Less ton lots	20.80	21.65	23.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast	**Turnings**	**Distilled**
Ton lots	**$1.85**	**$2.70**	**$3.40**
Less ton lots	**2.20**	**3.05**	**4.20**

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr. 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	18.00	19.10	21.05
Less ton lots	19.25	20.35	22.30

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.75	16.85	18.80
Less ton lots	17.00	18.10	20.05

Other Ferroalloys

Ferrotungsten, **standard, lump or ¼ x down, packed, f.o.b. plant** Niagara Falls, Washington, Pa. York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.25
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	**$2.90**
Crucible	**3.00**
High speed steel (Primos)	**3.10**
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2	$1.20
Ferrocolumbium, **50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb**	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, **55-75%, f.o.b Langeloth, Washington, Pa., per pound contained Mo.**	**95¢**
Calcium molybdate, **40-45%, f.o.b Langeloth, Washington, Pa., Per pound contained Mo.**	**80¢**
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	**80¢**
Molybdenum oxide, **in cans, f.o.b, Langeloth and Washington, Pa., per pound contained Mo**	**80¢**
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y. ton lots, per pound contained Ti	**$1.23**
Less ton lots	**$1.25**
Ferrotitanium, **20-25%, 0.10% C max., ton lots, per pound contained Ti**	**$1.35**
Less ton lots	**$1.40**
High **carbon ferotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton**	**$142.50**
Ferrophosphorus, **electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton**	**$65.00**
Zirconium, **35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.**	
Carload lots	**18.40¢**
Zirconium, **12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy**	
Carload, bulk	**6.00¢**
Alsifer, 20% Al, 40% Si, 40% Fe, **contract basis, f.o.b. Suspension** Bridge, N. Y.	
Carload	**6.90¢**
Ton lots	**7.40¢**
Simanal, **20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound**	
Car lots	**9.00¢**
Ton lots	**9.75¢**

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
100 lb or more	$1.20	$1.23	$1.21

Manganese — Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	**$1.89**	**$1.903**	**$1.935**
Less ton lots	**2.01**	**2.023**	**2.044**

Nickel—Boron **15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.**

Less ton lots	**$1.80**	**$1.8125**	**$1.8445**

Silcaz, **contract basis, f.o.b. plant freight allowed, per pound.**	
Carload lots	39.00¢
Grainal, **f.o.b. Bridgeville, Pa., freight allowed on 50 lb and over**	
No. 1	**93¢**
No. 6	**63¢**
No. 79	**45¢**
Bortram, **f.o.b. Niagara Falls**	
Ton lots, per pound	**45¢**
Less **ton lots, per pound**	**50¢**
Carbortam, **f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0% Al 1.0—2.0%.**	
Ton lots, per pound	**8.0¢**